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## A NEW SEPTOBASIDIUM ON PINUS STROBUS \*

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(WITH PLATES 11-13)

The writer is indebted for the opportunity to present this article to the kindness of Dr. E. A. Burt. Two years ago specimens of a species which appeared to be a *Septobasidium*, commonly found upon the bark of the eastern white pine, were sent to Dr. Burt for identification. In reply he stated that this fungus had never been found sporulating and suggested that an effort be made to find it in a fertile condition. The writer immediately began collecting the fructifications from different localities in New England, and later extended the field of observations to Wisconsin. Collections were made throughout that summer and fall into November and beginning again early the next spring. In the summer of 1920 at North Conway, N. H., August was ushered in with moist or rainy weather which lasted through the middle of the month. A collection made after about two weeks of this sort of weather showed that the probasidia had germinated and sporulation was taking place in abundance. The material was sent to Dr. Burt and he very magnanimously returned it to the writer for study and description. The name given to the fungus is *Septobasidium pinicola*.

This species of *Septobasidium* is a northern form growing at least as far north as northern New Hampshire, whereas most of the species of the genus are tropical or subtropical. *Septobasidium*

\* Office of Investigations in Forest Pathology, Bureau of Plant Industry, in cooperation with Department of Botany, Brown University.

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*pseudopedicellatum* is the only other species which appears in the temperate zone in the United States. The known geographical range of *S. pinicola* is thus far rather puzzling. The writer knows of its occurrence in all the New England states but Rhode Island and in New York, but no collections in Canada or the middle western white pine states are known. The writer is quite sure that he has collected it in Wisconsin, but the collection can not be found, nor can collections by others in Michigan, Wisconsin, or Minnesota be located. On the other hand, Dr. Weir, of this office, informs the writer that this same *Septobasidium* occurs also upon *Pinus monticola* in the western states and cites one of his collections from Idaho. No further data are at hand, however, relative to its distribution west of the Mississippi or of the possibility of its occurrence upon *Pinus lambertiana*. It is very likely to be found abundantly in certain loci in pine woods in the east, and occasionally dozens of the fruit bodies may be seen upon a single tree. They have been found only very rarely on trees under 3 inches in diameter at the base, but have been collected, however, on very small twigs of larger trees.

The fruit bodies of *S. pinicola* occur only upon the smooth bark of white pines. They are especially common in the angles made by the lower sides of the branches with the trunk (Plate 11). As far as the tree is concerned, the fungus is a pure epiphyte. It lives entirely superficially, and not only does not injure any living tissue, but does not even penetrate the outer bark (Plate 13, fig. 1). It is not associated with wounds, pitch flow, blister rust cankers, or any other fungus, although it is often overgrown with a lichen, especially when old. The fruit bodies do not bear any decided relation to the points of the compass. In some spots in the woods it has appeared that there were more fructifications upon the northeast half of the trunk than upon the southwest half, but this is by no means universally true. The sporophores are found more commonly on well-shaded portions of the trees, but they are occasionally found where they are exposed to the direct rays of the sun.

Other species of the genus *Septobasidium* are known to be associated with scale insects (1, pp. 321-322; 2; 3), and the status of *S. pinicola* in this respect is at once brought in question. An

entomogenous relation is suggested not only by this fact, but also by its manner of growth and the common occurrence of a scale insect upon the pine. Cursory observations show that such a relation exists. If a fruit body is carefully separated from the pine bark, the remains of the scale insects can readily be seen on the lower surface or on the pine bark, either as brown skeletons or cases, or white-lined pockets in which the insects were inclosed (Plate 12, fig. 1). If small fruit bodies 2-3 mm. large are examined, the white bodies of the insects are easily made out imbedded in the hyphae, and examination of these under the microscope leaves no doubt as to their identity or their relation of the fungus to them. The insects are overgrown and intergrown with mycelium of the fungus, which can be determined to be within their bodies (Plate 12, fig. 2). The hyphae in the youngest insects were hyaline (see fig. 2) and on the older ones were dark like that of the context.

The fructifications are more or less ashy colored and are conspicuous against the greenish bark of the pine. In structure *S. pinicola* differs from most of the species of *Septobasidium* described, inasmuch as the plainly 3-layered condition discernible in most of them is not present (Plate 13, fig. 1). There is more or less of a matting of the dark hyphae close to the substrate, but it is irregular and lacunar much as is the substance above it. The remainder of the context is made up of loosely intertwined hyphae running obliquely upward, leaving empty locules and giving the whole a spongy appearance. The hymenium is formed by branching of these hyphae which form the hyaline probasidia, being thus lighter in color than the rest of the structure. The subglobose to pyriform probasidia, both at and below the surface, germinate to form straight, hyaline, three-celled spore-bearing organs. Stages in the germination of the probasidia are shown in plate 13, figure 2. The spores are born singly from each of the three cells, and, as far as could be determined, in succession and acropetally. Figure 3 of plate 13 shows this very well. This is in line with Burt's observations with the other species (1, pp. 319-20).

**Septobasidium pinicola** sp. nov.

Fructification resupinate, effused, coriaceous, in general circular in shape, more or less concentrically sulcate, separable from substratum, roughly tomentose to strigose, army brown to natal-brown when dry, the margin light-drab to cinnamon-drab, strigose; in structure lacunar, spongy, 1-1.8 mm. thick, individual hyphae under the microscope clay-color to tawny-olive, thick-walled, even, 3-3.5  $\mu$  in diameter, loosely interwoven so as to form a spongy structure with locules, branching to form a lighter colored hymenium about 80-110  $\mu$  thick; probasidia terminal or lateral, hyaline, pyriform to subglobose, 10-15  $\times$  15-17  $\mu$ , throughout hymenium; spore-bearing organs straight, hyaline, 54-66  $\times$  6-7  $\mu$ , 3-septate, growing from probasidia and projecting above hymenium; spores hyaline, simple, curved, 14-17.5  $\times$  3-3.5  $\mu$ , borne singly from each of 3 cells of probasidium, acropetally as far as observed.

Fructification 3-60 mm. but more commonly 10-35 mm. in diameter, 1-1.8 mm. thick.

Type in herbarium of Walter H. Snell, No. 559; co-types in herbaria of Missouri Botanical Garden, No. 57093, and Forest Pathology, No. 36832.

On bark of living *Pinus strobus* in New England and New York and probably co-extensive with the habitat of this host; also on *Pinus monticola* in Idaho. Found sporulating after prolonged moist and rainy period in August.

## Collections known:

On *Pinus strobus*.

## Maine:

1 Standish: in F. P. No. 20639, coll. by W. H. Chadbourne; same in Mo. Bot. Gard. comm. by Dr. Perley Spaulding.

Kennebunkport: in Mo. Bot. Gard. No. 5091 and in Farlow Herb., coll. by Mrs. A. M. Pier, March and April.

1 Mount Vernon: in Mo. Bot. Gard., coll. by Dr. W. J. Morse, comm. by Dr. Perley Spaulding, March.

Kittery Point: in Farlow Herb., coll. by R. T. Baxter, spring.

Brunswick: in Herb. WHS No. 499, June.

## New Hampshire:

North Conway: in Herb. WHS No. 559 and No. 601; F. P. No. 36832, Aug. and Sept.; several coll. in Mo. Bot. Gard., comm. by the writer and one by Dr. A. S. Rhoads, Sept.

Welch's Island, Lake Winnepesaukee: WHS No. 502, June.

## Vermont:

Townshend: in Mo. Bot. Gard. No. 55603 and in Farlow Herb., coll. by W. G. Hastings, comm. by Dr. Perley Spaulding.

1 Specimens not examined by the writer.

Massachusetts:

Middleboro: WHS No. 597, August.

Wareham: WHS No. 598, August.

New York:

Lewis: WHS No. 604, coll. by Dr. L. H. Pennington, August.

On *Pinus monticola*.

Idaho:

St. Joe National Forest: coll. by Dr. J. R. Weir.

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LITERATURE CITED

1. Burt, E. A. The Thlephoraceae of North America. VII. *Septobasidium*. Ann. Mo. Bot. Gard. 3: 319-43. fig. 14. 1916.
2. Petch, T. Note on the biology of the genus *Septobasidium*. Ann. Bot. 25: 843. 1911.
3. ———. Fungi parasitic on scale insects. Trans. Brit. Myc. Soc. 1920, 7: 18-40. 1921.

EXPLANATION OF PLATES

PLATE 11

*Septobasidium pinicola* on bark of living *Pinus strobus*. Two fructifications are shown at the union of the branches with the trunk, where they often occur. Two-thirds natural size. Photograph by the author.

PLATE 12

Fig. 1. Lower surface of a young fructification of *Septobasidium pinicola*, showing remains of scale insects. The two groups of large bodies at the upper and lower right-hand corners of the fruit body are large ovoid or spheroid chitinous shells, dark-brown in color. The other crater-like depressions, mostly in the left half of the fruit-body, are white waxy cases enclosing scale insects such as is shown in fig. 2, which was removed from the hollow marked by the large dark spot in the center.  $\times 10$ .

Fig. 2. Scale insect removed from lower surface of fruit-body shown above, showing hyaline mycelium within the body of the insect.  $\times 143$ .

Photomicrographs by the author.

PLATE 13

Fig. 1. Discontinuous cross-section of portion of fruit-body of *Septobasidium pinicola*, showing relation to host tissue.

Fig. 2. Paraphysis-like organs (young probasidia ?) in hymenium.

Fig. 3. Probasidia, one of them dark-colored and thicker-walled.

Fig. 4. Germinating probasidia showing stages in the formation of spore-bearing organs.

Fig. 5. Spore-bearing organs, arising from probasidia, one showing successive acropetal formation of spores. The spore on the lower sterigma is not yet quite ripe, the second sterigma has just formed, and the apical one is forming.

Fig. 6. Spores.

Fig. 7. Chlamyospore-like bodies found in the hymenium. Whether or not these belonged to this fungus or to some invading mold could not be determined.

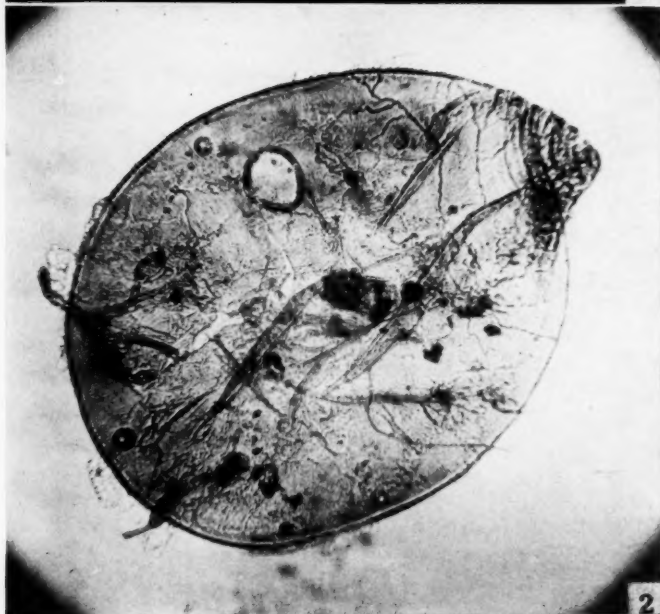
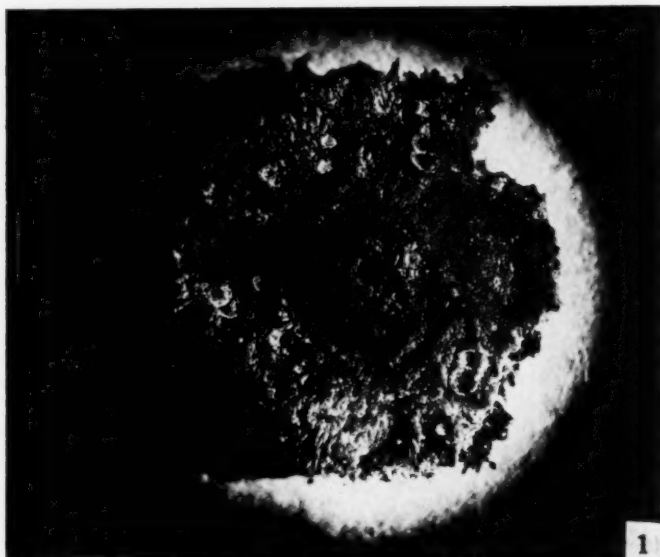


SEPTOBASIDIUM PINICOLA SNELL

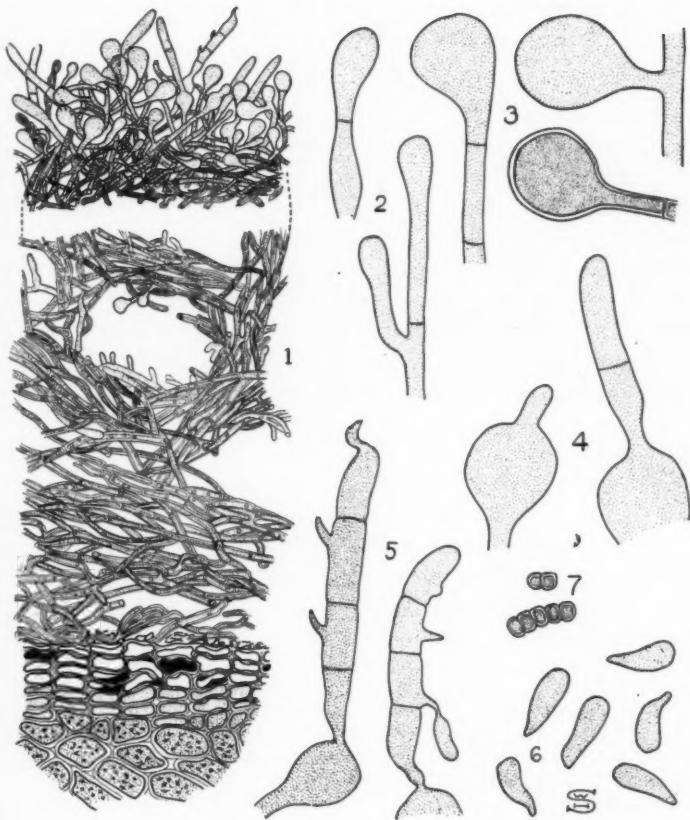
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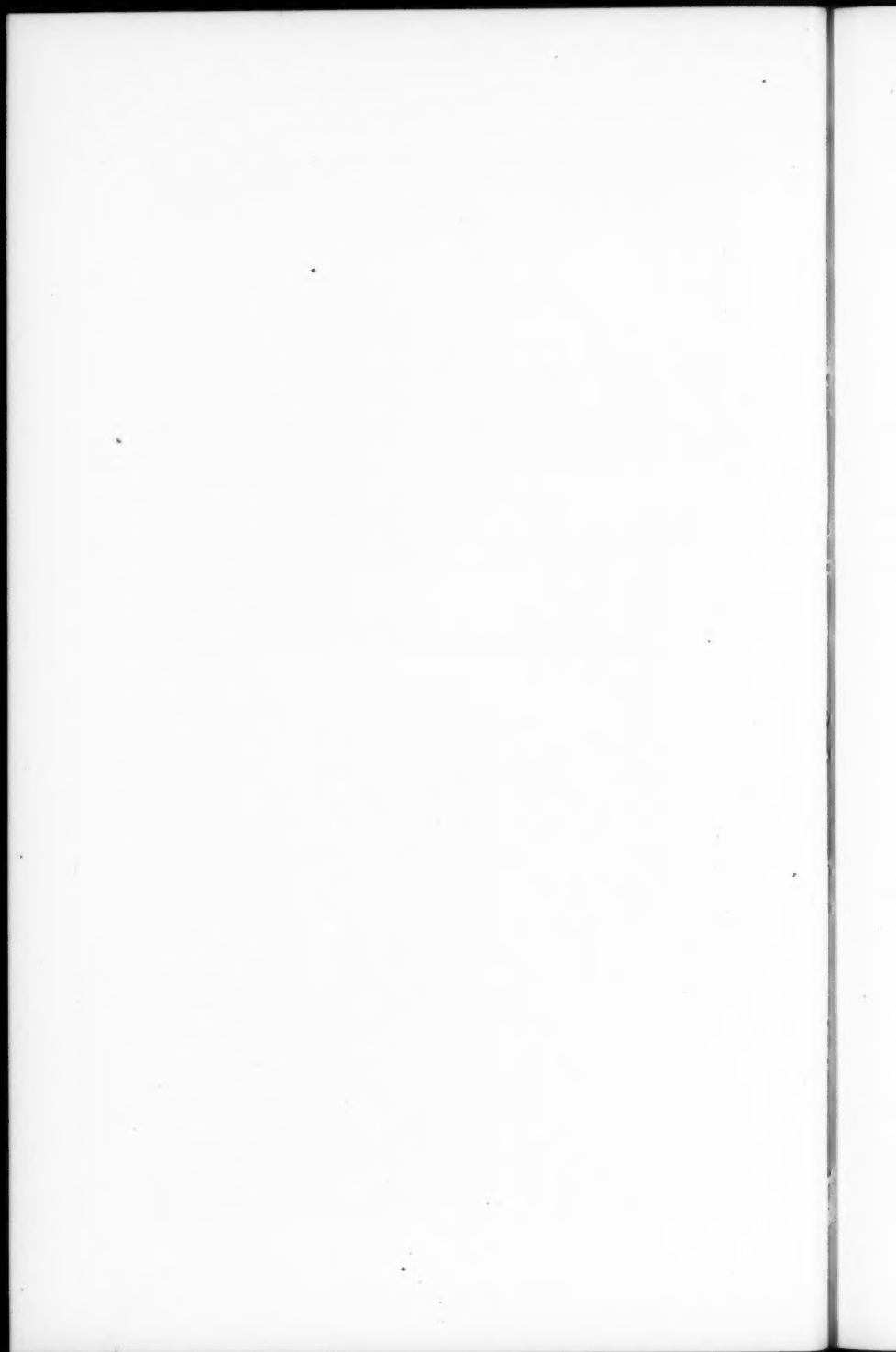


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## DARK-SPORED AGARICS—I

### DROSOPHILA, HYPHOLOMA, AND PILOSACE

WILLIAM A. MURRILL

In MYCOLOGIA for January and March, 1918, a series of eight articles on the gill-fungi of tropical North America was concluded with a treatment of species having brown, purplish-brown, or black spores. On page 15 in the January number of that year the fourteen genera of the subtribe Agaricanae were keyed out, beginning with the sessile *Melanotus* and ending with *Coprinus* and *Clarkeinda*, in which the characters are more complex.

The present series of articles will deal with species occurring in temperate North America, except those confined to the Pacific Coast, which have already been considered for the most part in articles published in MYCOLOGIA some years ago. The key to the genera need not be repeated here. I shall, for convenience, begin with the larger, more fleshy species and take up the small, slender-stemmed ones later, reversing the natural order.

The three genera of the present article may be distinguished from others of the subtribe by a fleshy or fibrous stem, gills that do not deliquesce, and little or no veil, which does not form a definite ring on the stem. They may be separated from each other by the following key:

Lamellae adnate or adnexed.

Hymenophore solitary or subcespitose, rarely densely cespitose; hygrophanous, viscid, or squamulose.

*Drosophila*.

Hymenophore densely cespitose; surface firm, dry, glabrous.

*Hypholoma*.

Lamellae free.

*Pilosace*.

#### DROSOPHILA Qué1. Ench. Fung. 115. 1886

Pileus hygrophanous, glabrous or nearly so, at least at maturity; spores pale, smooth.

Pileus dark-colored; spores  $5 \times 3 \mu$ .

1. *D. madeodisca*.

Pileus light-colored; spores larger.

Spores  $9-12 \mu$  long.

2. *D. pecosense*.

Spores  $7-9 \mu$  long.

- Pileus 1-2 cm. broad. 3. *D. fragilis*.  
 Pileus 2-6 cm. broad. 4. *D. appendiculata*.  
 Pileus floccose-scaly, grayish-white; spores small, dark, smooth. 5. *D. Storea*.  
 Pileus innately-fibrillose, becoming glabrous at times, some shade of reddish-brown; spores large, dark, distinctly tuberculose, and apiculate. 6. *D. lacrymabunda*.  
 Pileus glabrous, fibrillose, or squamulose; spores large, dark, smooth.  
 Pileus glabrous, bay-brown; spores not apiculate.  
 Surface moist, rugose. 7. *D. delineata*.  
 Surface viscid. 8. *D. Peckiana*.  
 Pileus large, reaching 10 cm. broad, densely and conspicuously covered with persistent, pointed scales. 9. *D. echiniceps*.  
 Pileus reaching 5 cm. broad, woolly or less conspicuously fibrillose-scaly.  
 Spores apiculate. 10. *D. rigidipes*.  
 Spores not apiculate. 11. *D. hololanigera*.

1. *Drosophila madeodisca* (Peck) comb. nov.

*Agaricus madeodiscus* Peck, Ann. Rep. N. Y. State Mus. 38: 88. 1885.

*Hypholoma madeodiscum* Sacc. Syll. Fung. 5: 1039. 1887.

*Hypholoma subaquilum* Banning & Peck, Ann. Rep. N. Y. State Mus. 44: 70. 1891.

Pileus thin, convex to expanded, the margin often upturned, gregarious to densely cespitose, 2-6 cm. broad; surface hygrophalous, smooth or rugose, slightly atomate at times, dull-fulvous or chestnut-colored when moist, becoming grayish or isabelline when dry; margin thin, even, silky-fibrillose at first; context concolorous, hygrophalous, edible, with mild taste and no characteristic odor; lamellae crowded, adnexed or slightly sinuate, pallid to purplish-brown; spores short-oblong or oblong-ellipsoid, blunt at both ends, smooth, guttulate, pale-purplish-brown under the microscope, usually about  $4.5 \times 3 \mu$ , rarely reaching  $7 \times 4 \mu$ ; stipe equal or somewhat thickened at the base, glabrous or slightly fibrillose, white or pallid, shining, usually hollow, 4-8 cm. long, 3-8 mm. thick; veil white, appendiculate, evanescent.

TYPE LOCALITY: Adirondack Mountains, New York.

HABITAT: On dead deciduous or coniferous wood, or in rich soil or leaf-mold in woods.

DISTRIBUTION: Eastern Canada to North Carolina and west to Colorado.

ILLUSTRATION: Mycologia 7: pl. 158, f. 7.

This species is very abundant in the northeastern United States, varying considerably in size and habit, but easily distinguished from *D. appendiculata* by its darker color and smaller spores, which are very blunt at both ends. When I described and figured it in MYCOLOGIA in 1915 as *H. Candolleanus*, I had not examined authentic European material, which shows at once much larger spores. *H. subaquilum* is represented at Albany by a dozen or more plants from Piseco and Lake Pleasant, New York, displayed on two herbarium sheets. Peck states that the spores are  $4-5\ \mu$  long, which is correct. *H. madeodiscum* is represented by only three plants, which do not appear different from the specimens of *H. subaquilum*, and the spores measure  $4-5 \times 3\ \mu$ , although Peck describes them as  $8-10 \times 5-6\ \mu$ . A specimen at Albany determined as *H. madeodiscum* by Burt, who collected it in Vermont, has been changed by Peck to *H. appendiculatum*.

2. *Drosophila pecosense*<sup>1</sup> (Cockerell) comb. nov.

*Hypopholoma pecosense* Cockerell, Jour. Myc. 10: 108. 1904.

Pileus 2.5 to nearly 4 cm. in diameter, slightly convex, sometimes slightly umbonate, margin nearly even, bearing remains of a veil as light-yellow, irregular scales; surface smooth, slightly inclined to be viscid, not at all striate, scaly or silky, creamy-white, more ochraceous on the disk, but always pallid; context not changing color on bruising or breaking, taste mild, not bitter; lamellae pale-purplish-gray, inclined to be white at the junction of the stipe, minutely white-furfuraceous on the edges; spores pale-purplish-brown under the microscope, broadly ellipsoid to slightly ovoid,  $9-12 \times 5-8\ \mu$ ; stipe yellowish-white or very pale ochraceous, slightly striate from the very narrowly decurrent lamellae, white-furfuraceous, otherwise smooth and shining, hollow near the apex, 5.5 to nearly 9 cm. long.

TYPE LOCALITY: Pecos, New Mexico.

HABITAT: Unknown.

DISTRIBUTION: Unknown.

<sup>1</sup> Since the above was put into type I have located the original specimens sent by Cockerell to Earle and they prove to be a species of *Stropharia*. See my next article.

The author describes the spores as purple-brown, quite dark, oval,  $12 \times 8 \mu$ ; but the specimens show them to be as above noted.

3. *Drosophila fragilis* (Peck) comb. nov.

*Hypholoma fragile* Peck, Bull. N. Y. State Mus. 131: 22. 1909.

Pileus thin, fragile, conic or subcampanulate, becoming convex, obtuse or subumbonate, 1.2–2.4 cm. broad; margin thin, at first appendiculate with fragments of the white veil; surface floccose-squamulose when young, glabrous when mature, yellowish, grayish or subochraceous, sometimes more highly colored in the center; lamellae thin, narrow, crowded, adnate, whitish or pallid, becoming purplish-brown; spores  $8-10 \times 4-5 \mu$ ; stipe slender, fragile, stuffed or hollow, glabrous or minutely floccose, white or pallid, 2.5–5 cm. long, 2–3 mm. thick.

TYPE LOCALITY: Star Lake, St. Lawrence County, New York.

HABITAT: On decayed wood and leaves in damp woods.

DISTRIBUTION: Known only from the type locality.

ILLUSTRATION: Bull. N. Y. State Mus. 131: pl. V, f. 1–7.

The description of this species reads very much like that of *D. appendiculata*, but the specimens appear different. I find the spores ovoid to ellipsoid, smooth, pale-yellowish-brown under the microscope,  $8-9 \times 3.5-5 \mu$ . The specimens from Painted Post are different, probably *D. appendiculata*. Fresh collections might enable one to place the species definitely under *D. appendiculata*.

4. *DROSOPHILA APPENDICULATA* Quél. Ench. Fung. 116. 1886

*Agaricus appendiculatus* Bull. Herb. Fr. pl. 392. 1788.

*Hypholoma appendiculatum* Quél. Champ. Jura Vosg. 115. 1872.

*Agaricus saccharinophilus* Peck, Ann. Rep. N. Y. State Mus. 25: 78. 1873.

*Agaricus incertus* Peck, Ann. Rep. N. Y. State Mus. 29: 40. 1878.

*Agaricus hymenoccephalus* Peck, Ann. Rep. N. Y. State Mus. 31: 34. 1879.

*Hypholoma cutifractum* Peck, Bull. Torrey Club 22: 490. 1895.

*Hypholoma flocculentum* McClatchie, Proc. S. Cal. Acad. Sci. 1: 381. 1897.

*Stropharia irregularis* Peck, Bull. Torrey Club 27: 16. 1900.

Pileus thin, fragile, ovoid or subcampanulate, then expanded, gregarious or caespitose, 2-6 cm. broad; surface hygrophanous, varying in color from white or pale-yellowish to light-brown or dark-honey-yellow, fading when old and dry, usually cracking with age, often radiately-wrinkled, glabrous or whitish-pulverulent, rarely floccose-scaly; margin sometimes purplish in tint, often wavy, adorned with fragments of the white, flocculent, fugacious veil; context thin, white, edible, of excellent flavor; lamellae adnate, crowded, narrow, white to purplish-brown, with the edges often uneven; spores ellipsoid or ovoid, smooth, purplish-brown,  $7-8 \times 4-4.5 \mu$ ; cystidia sac-shaped,  $40 \times 15 \mu$ ; stipe slender, equal, straight, hollow, easily splitting, white, glabrous below, pruinose or slightly furfuraceous at the apex, 2.5-7 cm. long, 2-6 mm. thick; veil white, appendiculate, evanescent or rarely persisting as an annulus.

TYPE LOCALITY: France.

HABITAT: On and about stumps, roots, trunks, and leaves of deciduous trees.

DISTRIBUTION: Temperate and tropical North America; also in Europe.

ILLUSTRATIONS: Atk. Stud. Am. Fungi f. 26, 27; Boud. Ic. Myc. 1: pl. 137; Bull. Herb. Fr. pl. 392, f. A, B, D; Bull. Conn. Geol. Nat. Hist. Surv. 15: pl. 27; Bull. N. Y. State Mus. 5: pl. 58, f. 13-20; Bull. U. S. Dept. Agr. 175: pl. 27, f. 2; Cooke, Brit. Fungi pl. 547 (587); Gill. Champ. Fr. pl. 130 (352); Hard, Mushr. f. 262; Mem. N. Y. State Mus. 3: pl. 60, f. 1-9; McIlv. Am. Fungi pl. 97a; Murrill, Ed. Pois. Mushr. f. 20; Mycologia 4: pl. 56, f. 1, 2; N. Marsh, Mushr. Book, pl. 22; Pat. Tab. Fung. 1: f. 349; Ricken, Blätterp. Deutschl. pl. 64, f. 5; Sow. Engl. Fungi pl. 324; Trans. Wisc. Acad. Sci. 17: pl. 83, f. C; 18: pl. 22, 23.

Two color forms of this common species have been figured in MYCOLOGIA. It is much paler than *D. madeodisca*, although resembling it in some respects. Some American mycologists have been uncertain regarding its identity, but Bulliard's figures A, B, and D are very clear. His figure C might be misleading, which, according to him, represents a sodden condition after long rains. The spores, like the plant, vary considerably. They are usually ellipsoid,  $7-8 \times 4-4.5 \mu$ , but may be  $5.5-9 \times 4-5 \mu$ . Few mushrooms are more delicate in flavor or more easily digested.

5. *Drosophila Storea* (Fries) comb. nov.

*Agaricus Storea* Fries, Epicr. Myc. 223. 1838.

*Hypholoma lacrymabundum* Quél. Champ. Jura Vosg. 113. 1872.

*Stropharia cotonca* Quél. Bull. Soc. Bot. Fr. 23: 328. 1877.

*Agaricus hypoxanthus* Phil. & Plowr. Grevillea 13: 48. 1884.

? *Agaricus populinus* Britz. Hymen. Südb. 4: 157. 1885.

*Hypholoma aggregatum* Peck, Ann. Rep. N. Y. State Mus. 46: 106. 1893.

*Hypholoma Pseudostorea* W. G. Sm. Jour. Bot. 41: 286. 1903.

Pileus convex or subcampanulate to subumbonate, densely cespitose, 3-5 cm. broad; surface dry, white or grayish, darker and sometimes rugulose on the disk, ornamented with a few appressed, pale-umbrinous or avellaneous, floccose-fibrillose scales; context white, soft, watery, thick, thin at the margin, odorless, mild; lamellae adnate or sinuate, rather crowded, whitish, becoming dark-brown, whitish and sometimes weeping on the edges; spores oblong-ellipsoid, smooth, brown,  $6-8 \times 3-4 \mu$ ; stipe long, slender, equal, fibrillose, striate at the apex, white to discolored, often yellowish at the base when bruised, solid or hollow, 5-10 cm. long, 4-10 mm. thick; veil white, thick, often forming a fragmentary annulus.

TYPE LOCALITY: Sweden.

HABITAT: In rich soil in woods, usually about logs or stumps. It seems fond of beech.

DISTRIBUTION: New York, New Jersey, Michigan, and probably in other parts of the eastern United States; also in Europe.

ILLUSTRATIONS: Bull. N. Y. State Mus. 54: pl. 79, f. 8-14; Bull. Soc. Myc. Fr. 23: pl. 2, f. 5; Cooke, Brit. Fungi pl. 543 (580); Fries, Ic. Hymen. 2: pl. 134, f. 1; Mycologia 6: pl. 113, f. 5.

This species was first named by Fries from specimens collected by himself about beech trees in Sweden, the covering of matted hairs suggesting to him the specific name used. He saw it only twice, and it is rare in America, although several times collected about New York City. The plants first seen by Peck from Alcove were considerably smaller than the European form, but his variety *sericeum*, from North Bolton, is larger and smoother. Those interested in the rather complicated history of the species may refer to Maire's notes in Bull. Soc. Myc. France 27: 441-445. 1911,

or to condensed statements of his views by Kauffman under *H. lacrymabundum* in "The Agaricaceae of Michigan" and E. T. Harper in *Mycologia* 10: 231-234. 1918. According to Kauffman, cystidia are present in this species, being rather abundant, ventricose,  $30-40 \times 12-15 \mu$ .

6. *DROSOPHILA LACRYMABUNDA* (Bull.) Quél. Ench. Fung. 115.  
1886

*Agaricus lacrymabundus* Bull. Herb. Fr. pl. 194. 1784.

*Agaricus velutinus* Pers. Syn. Fung. 409. 1801.

*Hypholoma rugocephalum* Atk. Stud. Am. Fungi 30. 1900.

*Hypholoma Boughtoni* Peck, Bull. N. Y. State Mus. 139: 23.  
1910.

Pileus rather fleshy, ovoid to expanded, sometimes broadly umbonate, solitary or cespitose, 5-8 cm. broad; surface fulvous to isabelline with intermediate shades, darker on the umbo, covered when young with appressed, matted fibers, which may disappear with age or collect into small squamules, the cuticle cracking areolately at times; margin not striate; context very thin, concolorous, with a mild or slightly disagreeable taste, the odor not characteristic; lamellae rather crowded, sinuate-adnexed or adnate, somewhat ventricose, yellowish, shading to umber and spotted with black and rusty-brown as the spores mature, whitish on the edges; spores nearly lemon-shaped, apiculate, opaque, distinctly tuberculose, very dark-brown under the microscope, black in mass,  $8-10 \times 4-7 \mu$ ; cystidia abundant,  $40 \times 9 \mu$ ; stipe equal or slightly enlarged below, subconcolorous, nearly white at the apex, hollow, 5-10 cm. long, 8-12 mm. thick; veil of whitish, fibrous tufts adhering partly to the margin of the pileus and partly to the stipe.

TYPE LOCALITY: France.

HABITAT: In grass or weeds in the open or among leaves or about old stumps in thin woods.

DISTRIBUTION: Eastern United States; also in Europe.

ILLUSTRATIONS: Atk. Stud. Am. Fungi f. 28, 29; Bull. Herb. Fr. pl. 194, pl. 526 (better); Cooke, Brit. Fungi pl. 563 (582); *Mycologia* 7: pl. 158, f. 2; Peck, Bull. N. Y. State Mus. 139: pl. 2, f. 1-7; Sowerby, Engl. Fungi pl. 41; Trans. Wisc. Acad. Sci. 17: pl. 79; and others.

This interesting species has received much attention from my-

cologists, both in Europe and America (See Mycologia 7: 116. 1915). The spores are distinctive, being apiculate and plainly tuberculose. *D. echiniceps*, with which it has been confused by some, has smooth spores and larger, more persistent squamules. Types of *Hypholoma rugocephalum* and *H. Boughtoni* have been carefully compared and prove to be only forms of Bulliard's original plant, which ranges through Europe as far northward as Sweden and through the northern United States westward to Minnesota. This species, which certainly is very distinct, was used as the type of three different genera proposed between 1886 and 1889 by Patouillard, Schroeter, and Fayod.

7. *Drosophila delineata* (Peck) comb. nov.

*Hypholoma delinatum* Peck, Bull. N. Y. State Mus. 150: 83. 1911.

Pileus fleshy, thin, convex to subumbonate, or nearly plane, often slightly depressed in the center, 2.5-5 cm. broad; surface moist, glabrous, rugose or radiately wrinkled, commonly marked toward and on the margin even when dry with irregular radiating lines or ridges, occasionally wavy or irregular on the margin and not striate, brown, tawny-brown, or reddish-brown, often darker on the disk; context whitish; lamellae thin, crowded, adnate, flesh-colored to brown, becoming blackish-brown with age or when bruised; spores smooth, ellipsoid, not apiculate,  $8-10 \times 4-6 \mu$ ; cystidia scarce, flask-shaped or broadly fusiform,  $40-60 \times 16-20 \mu$ ; stipe equal, glabrous or subfibrillose, hollow, pallid or colored like the pileus, 3-7 cm. long, 3-8 mm. thick.

TYPE LOCALITY: Port Jefferson, Suffolk County, New York.

HABITAT: On the ground or on decayed wood.

DISTRIBUTION: Massachusetts, New York, West Virginia, Indiana, and Missouri.

ILLUSTRATION: Trans. Wisc. Acad. Sci. 18: pl. 21, f. D.

8. *Drosophila Peckiana* (Kauffm.) comb. nov.

*Hypholoma Peckianum* Kauffm. Agar. Mich. 1: 258. 1918.

Pileus 1-2 cm. broad, convex, obtuse, subexpanded, margin bordered by white, silky fibrils from the remains of the veil, even; surface viscid, glabrous, bay-brown, blackish on the disk, paler on

the margin; context whitish, moderately thin, thicker at the center, odor and taste none; lamellae adnate, rounded behind, 2-3 mm. broad, abruptly narrower in front, close, at first flesh-colored, then dark-purplish-brown, white-fimbriate on the edges; spores ventricose-ellipsoid, pointed at each end, smooth, tinged with purple under the microscope, purplish-brown in mass,  $10-12 \times 5-6 \mu$ ; cystidia none; sterile cells on the edge of the lamellae clustered, linear-cylindric, obtuse, about  $20 \times 4 \mu$ ; stipe thick, equal, white-floccose above, innately-fibrillose elsewhere, pallid to brownish, brown within, except the white pith, at length hollow, flexuous, 3-4 cm. long, 2-2.5 mm. thick.

TYPE LOCALITY: New Richmond, Michigan.

HABITAT: On debris of leaves and decayed wood in woods of hemlock, beech, maple, etc.

DISTRIBUTION: Known only from the type locality.

9. *Drosophila echiniceps* (Atk.) comb. nov.

*Hypholoma echiniceps* Atk. Ann. Myc. 7: 370. 1909.

Pileus convex, firm, fleshy, cespitose, 3-10 cm. broad; surface ochraceous-brown, with dense, pointed, seal-brown scales; context white, then changing to pale-saffron-yellow, with very slight taste and odor; lamellae somewhat narrowed in front, slightly rounded behind, adnate, rich-purple-brown with Indian-purple tint, whitish on the edges, 6-8 mm. broad; spores subellipsoid, inequilateral, the outer end sometimes slightly narrower, smooth as seen under oil immersion,  $7-9 \times 3.5-5 \mu$ ; cystidia cylindric, thin-walled,  $10-12 \mu$  thick, projecting  $30-40 \mu$ ; stipe white, covered up to the evanescent annulus with fibrous, seal-brown scales, even, fleshy, fibrous, hollow, white to yellow within, 12-14 cm. long, 8-12 mm. thick; veil ample when young, becoming appendiculate and forming an evanescent, superior annulus.

TYPE LOCALITY: Ithaca, New York.

HABITAT: On the ground or about dead stumps or roots.

DISTRIBUTION: Ontario, New York, Pennsylvania, Ohio, Michigan, and Wisconsin.

ILLUSTRATIONS: Trans. Wisc. Acad. Sci. 17: pl. 77, f. B, and pl. 78.

This species is confused by Peck with *D. lachrymabunda*. He had a number of collections from New York and elsewhere.

10. *Drosophila rigidipes* (Peck) comb. nov.

*Hypholoma rigidipes* Peck, Bull. N. Y. State Mus. 139: 24. 1910.

Pileus fleshy, thin, convex or broadly convex, gregarious, 2.5–5 cm. broad; surface dry, fibrillose-squamulose, tawny-brown, often reddish on the disk; context whitish, with a mild taste; lamellae close, narrow, slightly sinuate, adnexed, brownish-red, becoming dark-purplish-brown or black; spores ellipsoid, apiculate, 10–12 x 6–8  $\mu$ ; stipe slender, rigid, equal, hollow, fibrillose-squamulose, concolorous or a little paler than the pileus, 5–10 cm. long, 4–6 mm. thick.

TYPE LOCALITY: North River, Warren County, New York.

HABITAT: Damp places among tall herbs.

DISTRIBUTION: New York and Massachusetts.

ILLUSTRATIONS: Bull. N. Y. State Mus. 139: pl. 3, f. 1–6.

The spores of Peck's type are slender, smooth, very dark, apiculate, 8.5–10 x 6–7  $\mu$ . Two collections made by me in the Adirondacks have spores that are narrower, more inequilateral, and somewhat lighter in color, measuring 9–10.5 x 5  $\mu$ . The plants are also much less fibrillose-squamulose, appearing almost glabrous in dried specimens. In spite of these differences, however, I hesitate to separate them as a distinct species.

11. *Drosophila hololanigera* (Atk.) comb. nov.

*Hypholoma hololanigerum* Atk. Ann. Myc. 7: 371. 1909.

Entire hymenophore covered with dense, long, delicate, whitish, fibrous scales. Pileus ovoid to convex, fragile, gregarious, 2–2.5 cm. broad; surface hygrophanous, watery-brown, becoming pale-ochraceous-buff to pinkish-buff on drying, not striate; lamellae elliptic, adnate, purplish-brown, whitish on the edges; spores sub-ellipsoid, slightly inequilateral, reddish-purple, smooth, 7–9 x 3.5–4.5  $\mu$ ; cystidia ellipsoid, stalked, 40–50 x 12–15  $\mu$ ; stipe slender, hollow, fragile, even, white with a very pale pink tint, 6–7 cm. long, 4–5 mm. thick.

TYPE LOCALITY: Ithaca, New York.

HABITAT: On very rotten wood in woods.

DISTRIBUTION: Known only from the type locality.

The type of this species has been destroyed by insects, leaving only the spores, a bit of stipe, and the description.

## DOUBTFUL AND EXCLUDED SPECIES

*Drosophila atrofolia* (Peck) Murrill, *Mycologia* 4: 303. 1912. Specimens at Albany, so named by Peck, collected by Lloyd in Ohio, are specifically distinct from the types collected by McClatchie in California.

*Hypholoma Candolleianum* (Fries) Quél. Champ. Jura Vosg. 115. 1872. (*Agaricus Candolleianus* Fries, Obs. Myc. 2: 182. 1818.) Given the long name, *Agaricus violaceolamellatus*, by Decandolle in Flora France 2: 153, which Fries changed as above. Some claim that it is not distinct from *D. appendiculata*, which often shows violet or purplish colors in its young gills at one stage and has similar spores. Specimens from Bresadola show smooth, broadly ellipsoid or ovoid spores measuring  $7-9 \times 4-5 \mu$ . At Kew the two species seem exactly the same. Peck says his *H. madeodiscum* differs in having white gills at early stages. He has a sheet with plants from North Greenbush, New York, marked "*H. Candolleianum*. Spores  $8-10 \times 4-5 \mu$ . *H. velutinum leioccephalum* B. & Br." Also a packet from Mt. McGregor. The characters usually ascribed to *H. Candolleianum* as distinct from *H. appendiculata* are the violet color of the young gills, the darker color of the pileus, and the striations at the apex of the stipe.

*Hypholoma comatum* Atk. Proc. Am. Phil. Soc. 57: 355. 1918. Described from specimens collected at Ithaca, New York, in 1917. Type not seen.

*Hypholoma confertissimum* Atk. Proc. Am. Phil. Soc. 57: 355. 1918. Described from specimens collected near Oakland, Maryland, in 1917. Type not seen.

*Hypholoma coronatum* (Fries) Sacc. Syll. Fung. 5: 1038. 1887. (*Agaricus coronatus* Fries, Hymen. Eur. 295. 1874.) Reported several times from North America. Authentic specimens show it to be very near *D. appendiculata* (if not that species), with dentiform-appendiculate veil making the margin look like the edge of a crown, as shown in Fries, Ic. Hymen. pl. 134, f. 3. Morgan says *H. subaquilum* is *H. coronatum*, but that can not be true, because the spores of the latter measure  $7-9 \times 3.5-5 \mu$  and are ellipsoid with rounded ends. At Albany, several specimens called *H. coronatum* by Peck are spread on a sheet marked "Menands, N. Y.,

Peck. Spores ellipsoid,  $6-8 \times 4-5 \mu$ ." These are considerably darker than typical specimens from Europe. Compare Kauffman's description, except that of the spores, with mine of *D. madeodisca*.

*Drosophila hydrophila* (Bull.) Quél. Ench. Fung. 116. 1886. Reported several times from America. Specimens so named by Peck, collected by Miss White in Maine, are *Psilocybe conissans* Peck. Kauffman retains the species in *Hypholoma*, rather than *Pilosace*, because the gills are "adnate-seceding." See his notes on page 266 of his book, where he refers to the disagreement regarding spores. I find them in specimens from Bresadola, who knows Bulliard's plants exceptionally well, to be broadly ellipsoid, blunt at the ends, smooth, pale-purplish-brown under the microscope,  $4-5 \times 3.5 \mu$ —very near those of *D. madeodisca*.

*Hypholoma populinum* Britz. var., Kauffm. Agar. Mich. 1: 261. 1918. Maire finds these subtriangular spores in *Drosophila Storea*.

#### HYPHOLOMA (Fries) Quél. Champ. Jura Vosg. 112. 1872

Pileus brick-red.

1. *H. lateritium*.

Pileus yellow, often red on the disk.

Taste bitter.

2. *H. fasciculare*.

Taste mild.

3. *H. capnoides*.

#### I. HYPHOLOMA LATERITIUM (Schaeff.) Quél. Champ. Jura Vosg. 112. 1872

*Agaricus lateritius* Schaeff. Fung. Bavar. Ind. 22. 1774.

*Agaricus sublateritius* Fries, Epicr. Myc. 221. 1838.

*Agaricus perplexus* Peck, N. Y. State Cab. 23: 99. 1872.

Pileus convex to nearly plane, slightly umbonate at times, generally cespitose, 3-8 cm. broad; surface smooth, dry, glabrous, latericeous to bay; margin cream-colored to ochraceous; context mild or bitterish, white or nearly so, becoming yellow with age; lamellae adnate, somewhat rounded, sometimes slightly decurrent, thin, narrow, crowded, whitish or pale-yellow, becoming greenish, and finally purplish-brown from the ripening of the spores; spores ellipsoid, smooth, purplish-brown,  $7-8 \times 4 \mu$ ; cystidia few,  $36 \times 12 \mu$ ; stipe thick, subequal, firm, stuffed or hollow, glabrous or slightly fibrillose, stramineous above, ochraceous or reddish below,

ornamented with an arachnoid ring when young, which becomes conspicuous by reason of the spores which collect upon it, 5-12 cm. long, 5-12 mm. thick.

TYPE LOCALITY: Bavaria.

HABITAT: On or about old trunks or stumps of deciduous trees in autumn.

DISTRIBUTION: Eastern North America; also in Europe.

ILLUSTRATIONS: Atk. Stud. Am. Fungi f. 25; Bull. Conn. Geol. Nat. Hist. Surv. 3: pl. 25; Bull. U. S. Dept. Agr. 175: pl. 27, f. 1; Cooke, Brit. Fungi pl. 557 (572), pl. 558 (573); Gill. Champ. Fr. pl. 130 (357); Hard. Mushr. f. 265, 266; Peck, Ann. Rep. N. Y. State Mus. 49: pl. 47, f. 11-18; Peck, Mem. N. Y. State Mus. 4: pl. 60, f. 10-17; Murrill, Ed. Pois. Mushr. f. 19; Mycologia 1: pl. 1, f. 1; N. Marsh. Mushr. Book, pl. 21, 23; Richon & Roze, Atl. Champ. pl. 25, f. 10-13; Ricken, Blätterp. Deutschl. pl. 65, f. 2; Schaeff. Fung. Bavar. pl. 49, f. 6, 7; Trans. Wisc. Acad. Sci. 17: pl. 72, 73; 18: pl. 19.

This common autumnal species, which is ordinarily known as *Hypholoma sublateritium* or *H. perplexum*, was first described by Schaeffer as *Agaricus lateritius*, but on his plate he unfortunately used plants of *H. fasciculare* for the younger stages of his species, and this has caused confusion. Hudson referred to this plate and to Schaeffer's name when he described his *A. fascicularis*.

2. *HYPHOLOMA FASCICULARE* (Huds.) Qué. Champ. Jura Vosg.  
113. 1872

*Agaricus fascicularis* Huds. Fl. Angl. ed. 2. 615. 1778.

Pileus fleshy, convex to expanded, often obtuse or umbonate, cespitose, about 5 cm. broad; surface dry, smooth, glabrous, sulfur-yellow or lemon-yellow, flavo-luteous to reddish-bay on the disk; context yellow, bitter; lamellae adnate, crowded, linear, sulfur-yellow, becoming greenish and finally olive-brown; spores ovoid or ellipsoid, smooth, very pale yellowish under the microscope, 6-7 x 3-4  $\mu$ ; stipe slender, flexuous, smooth, glabrous or fibrillose, usually hollow, sulfur-colored to lemon-yellow; veil slight, fibrillose, pale-yellow.

TYPE LOCALITY: England.

HABITAT: Dead wood of all kinds.

DISTRIBUTION: Temperate regions.

ILLUSTRATIONS: Cooke, Brit. Fungi *pl.* 561 (576); Gill. Champ. Fr. *pl.* 131 (354); Hussey, Ill. Brit. Myc. 2: *pl.* 15; Pat. Tab. Fung. 1: *f.* 116; and others.

A common temperate species widely distributed on both coniferous and deciduous wood, and found in the greatest profusion on the Pacific coast. Plants found by me in Europe and America, and by Earle in Alabama, are recorded as having yellow, very bitter flesh. Several other specific names have been assigned to the plant in Europe. An old French chart includes it among the dangerous mushrooms.

3. *HYPHOLOMA CAPNOIDES* (Fries) Quél. Champ. Jura Vosg. 338.  
1873

*Agaricus capnoides* Fries, Obs. Myc. 2: 27. 1818.

*Geophila capnoides* Quél. Ench. Fung. 113. 1886.

Pileus fleshy, convex or nearly plane, obtuse, solitary or caespitose, 2.5-8 cm. broad; surface glabrous, dry, yellowish, often reddish or ochraceous on the disk; context white, with mild taste and odor; lamellae moderately close, adnate, dry, smoky-gray, becoming brown or purplish-brown; spores 7-8 x 4-5  $\mu$ ; stipe equal or nearly so, silky, striate at the apex, sometimes curved or flexuous, hollow, pallid, 4-8 cm. long, 4-6 mm. thick.

TYPE LOCALITY: Sweden.

HABITAT: Stumps and logs of coniferous trees.

DISTRIBUTION: Throughout the northern part of North America; also in Europe.

ILLUSTRATIONS: Cooke, Brit. Fungi *pl.* 559 (574); Fries, Ic. Hymen. *pl.* 133, *f.* 1; Gill. Champ. *pl.* 131 (353); Harper, Trans. Wisc. Acad. Sci. 17: *pl.* 74; Ricken, Blätterp. Deutschl. *pl.* 65, *f.* 5.

I have discussed this species in my articles on the fungi of the Pacific coast. Peck had a number of specimens, finding it alone, to the exclusion of *H. fasciculare*. Kauffman found neither species; Harper found both. Bresadola and I collected it in the Tyrol and I made the following notes from fresh specimens: "Looks like specimens I got in the Adirondacks. Smooth or cracked, glabrous, ochraceous, paler on the margin; veil slight, pallid, evanescent; gills pallid when young, adnate or adnexed,

rather distant, plane or arcuate; stipe smooth, shining, slightly fibrillose, pallid at the apex, darker and usually thicker below. Cespitose on dead pine wood. Flesh not noticeably bitter, lemon-yellow." Spores from these specimens are ovoid or ellipsoid, smooth, very pale yellowish under the microscope,  $7-9 \times 4-5.5 \mu$ . Specimens collected by Earle in New York also had yellowish flesh and a mawkish (not bitter) taste.

## DOUBTFUL AND EXCLUDED SPECIES

*Agaricus (Hypholoma) Artemisiae* Pass. Nuovo Giorn. Bot. Ital. 4: 82. 1872. Reported by Peck from Brewerton, New York, but the specimens were later found to belong in *Hebeloma*.

*Agaricus (Hypholoma) comaropsis* Mont. Syll. Crypt. 122. 1856. Collected at Columbus, Ohio, by Sullivan. Types not seen.

*Agaricus hirtosquamulosus* Peck, Bull. Buffalo Soc. Sci. 1: 53. 1873. Transferred to *Hypholoma* by Saccardo. Collected by Peck on maple logs in woods at Portville, Cattaraugus County, New York. Four specimens and a drawing are on the type sheet, where Peck has written "Not a good *Hypholoma*. *Naucoria*." Specimens in a box at Albany from St. Louis, Missouri, collected by Glatfelter, have gills colored like the types, but the surface is darker and more hairy, as in *Naucoria pennsylvanica*.

*Agaricus (Hypholoma) nitidipes* Peck, Ann. Rep. N. Y. State Mus. 35: 133. 1884. Collected by Peck at Albany, New York. The two poor specimens on the type sheet at Albany are marked by Peck "*Pholiota duroides*." They certainly do not appear to be a species of *Hypholoma*.

*Agaricus (Hypholoma) ornellus* Peck, Ann. Rep. N. Y. State Mus. 34: 42. 1883. *Pholiota ornella* Peck, Bull. N. Y. State Mus. 122: 151. 1908. See *Gymnopilus polychrous* (Berk.) Murrill, N. Am. Fl. 10: 204. 1917.

PILOSACE (Fries) Pat. Hymén. Eur. 122. 1887

In MYCOLOGIA for March, 1918, I discussed this genus from the standpoint of the two tropical American species assigned to it by Fries. It differs from *Agaricus* in lacking a veil. In 1904 Peck

characterized it as agreeing with *Pluteus*, but having black or purplish-brown spores. He mentioned 2 species from Europe, 2 from the West Indies, 1 from Africa, and 1 from the United States, this last being his *Pilosace eximia*, which is discussed elsewhere in the present number of MYCOLOGIA.

According to Harper, our *Stropharia epimyces* (Peck) Atk. is not distinct from *Pilosace algeriensis*, but he can not suggest to what group of fungi the species may belong. According to Kauffman, who retains it in *Stropharia*, "our plant is not a *Pilosace*." Fries based his subgenus *Pilosace* on *Agaricus tricholepis*, definitely characterized by *free gills*, and Patouillard subsequently raised it to generic rank.

NEW YORK BOTANICAL GARDEN.

## A NEW SPECIES OF MYRIANGIUM ON PECAN

L. E. MILES

(WITH PLATE 14)

On the living bark of the pecan, *Carya illinoensis*, in southern Mississippi, as well as elsewhere, probably throughout the entire range of the host, one finds a black fungus growth, sometimes in considerable abundance. It is quite superficial in character, occurring in the form of wart-like or knob-like tubercles on the unspotted and uninjured younger bark. But rarely, if ever, is it found on the rough, scaly portions, and never has it been observed growing on dead trees. It is found on all varieties of the host tree, more abundantly on those trees which have suffered somewhat from neglect and lack of proper care, but occasionally is abundant in thrifty, well-cared-for orchards. It has never been observed on the hickory, though it has been seen on pecan limbs and twigs which had been top-worked onto that tree.

Though quite superficial and apparently causing no injury to the host, the fungus is an object of considerable concern to growers in that it mars the appearance of their trees. It is the cause of numerous inquiries, and, therefore, it has been deemed worth while to devote some little attention to it. Although superficially described and pictured by McMurran and Demaree,<sup>1</sup> the causal organism has never been determined.

### MORPHOLOGY

The tubercles vary in size, ranging from 1 millimeter to 3 or 4 millimeters in diameter. The shape also varies, but isolated specimens usually approximate the hemispherical in form. Often a number of them are found crowded together, but rarely do they become confluent. The color varies from a very dark reddish-black to a coal-black. The surface is usually considerably con-

<sup>1</sup> McMurran, S. M., and Demaree, J. B.: Diseases of Southern Pecans, U. S. Farmers' Bulletin No. 1129 (1920), p. 20.

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voluted or verrucose, sometimes almost papillate, almost never smooth. The tubercles are solidly attached to the bark by a narrower, stipe-like portion which appears to penetrate through the outer corky portion into the living phloem tissue.

The inner portion of the tubercle is reddish-brown in color, and is densely and uniformly pseudoparenchymatic in structure, with a very thin, darker, crust-like layer on the outside. Occasionally streaks of slightly darker, thicker-walled cells will be found extending through this uniform tissue. Such streaks are usually located a short distance beneath the beginning of the loculiferous region. This portion, in which the asci occur, lies near the periphery of the tubercle, just beneath the crust-like layer, and on the outer side of each of the convolutions.

The locules are closely crowded together, often being separated by only one or two rows of the pseudoparenchymatous stromatic cells. They are subglobose to broadly ovate or oval in form and occur in several layers, some of the outer convolutions being almost entirely loculiferous. In microtome section this portion of the tubercle-like stroma has a very open, porous appearance. Even when cut with a knife in the natural condition while still attached to the tree, this locule-bearing tissue has a gray, powdery appearance in contrast to the dark brick-red or brownish-black of the solid, homogenous, sterile portion beneath it.

Each locule is lined with a thick, hyaline sheath, inside which occurs a single ascus. When the stroma is crushed and examined under the microscope, this sheath easily separates from the tissue of the stroma and remains about the ascus, giving the appearance of being merely a very thick ascus wall. If the sheath becomes ruptured, however, the ascus immediately expands, chiefly in a longitudinal direction, often to two or two and one half times its original length, becoming oblong, broadly spindleform, or ovate with blunt rounded ends, while the ruptured locule sheath collapses about its base. The ascus wall is quite thin as compared with this sheath, except at the apical end, where it is heavily thickened. There is no apical pore and the method of spore discharge has not been observed. Since the locules are indehiscent, and the pore at the apex of the ascus is absent, this probably is brought about by

the irregular rupture of the ascus wall. Each ascus contains eight spores. There are no paraphyses.

The locules average  $50 \times 50$ – $50 \times 60 \mu$  while still in position in the stroma. When freed they become more oval in form, probably due to the expansion of the ascus on absorbing water, when they average  $62$ – $65 \times 40 \mu$ . The ascus entirely fills the locule, but after the rupture of the sheath has occurred it becomes  $90$ – $95 \mu$  in length, contracting but little at its broadest part, the middle, but considerably toward each end.

The spores are multiseptate-muriform, large, oblong, and straight or sometimes slightly curved. They are seven- to eight-septate, with the middle septum much more definite than either of the others. There may be a slight constriction at either of the cross septa, but it is always more pronounced at this middle septum. The longitudinal septations are irregular, as are the others, with the exception of the middle one, dividing the spore into irregular somewhat cubical portions. When observed from the end in optical section the spore appears to be built about a very small, hollow central core, the segments being arranged about this very much in the manner of the grains on the cob of an ear of corn, when it, likewise, is observed from the end. The segments, however, are much fewer in number than in this latter case, the average number about the central core being 5 to 7. The spores average from  $25$ – $28 \mu$  in length by  $10$ – $11 \mu$  in breadth. They are ordinarily observed to be hyaline, but in quite mature specimens they have a very faint yellowish tint.

#### IDENTITY

The morphology of the fungus, especially the character of the indehiscent, monoascicular loculi scattered throughout or rather grouped toward the periphery of a pseudoparenchymatous stroma point at once to the family Myriangiaceae. The resemblance of members of this family to the Tuberales has been pointed out by Saccardo and Engler and Prantl. They exclude them from that order on account of their aerial, parasitic or saprophytic habit, and their general appearance. Von Höhnelt monographed this family in 1905 and places it in the Discomycetes close to the Tuberales.

The fungus appears to fall in the genus *Myriangium* as revised by Von Höhnelt, and since it does not agree with any species described under it, the following name is proposed:

***Myriangium tuberculans* sp. nov.**

Stromatibus tuberculi-formibus, primo immersis, demum superficialibus, solitariis vel gregariis, firmiter affixis, 1-3 vel 4 mm. diam., irregulariter hemisphaericis, ruguloso-verrucosis vel subpapillatis, interdum mutua pressione angulosis, atris, vel rufo-bruneis, intus atosanguineis, vel fusco-bruneis, contextu pseudo-parenchymaticis; loculis numerosis, subpolystichis, subperiphericis, globosis vel ovatis, monoascis, indehiscentibus; ascis subglobosis vel ovatis, crasse tunicatis, 8-sporis, aparaphasatis,  $62-65 \times 40 \mu$ ; sporidiis oblongis, rectis vel leniter curvulis, utrinque obtusis, tranverse 7-septatis, muriformiter divisis, ad septa leniter constrictis, hyalinis, vel demum subflavidulis,  $25-28 \times 10 \mu$ .

HABITAT: In cortice vivo *Caryae illinoensis*, Mississippi, America boreale.

STATE PLANT BOARD,

AGRICULTURAL COLLEGE, MISSISSIPPI.

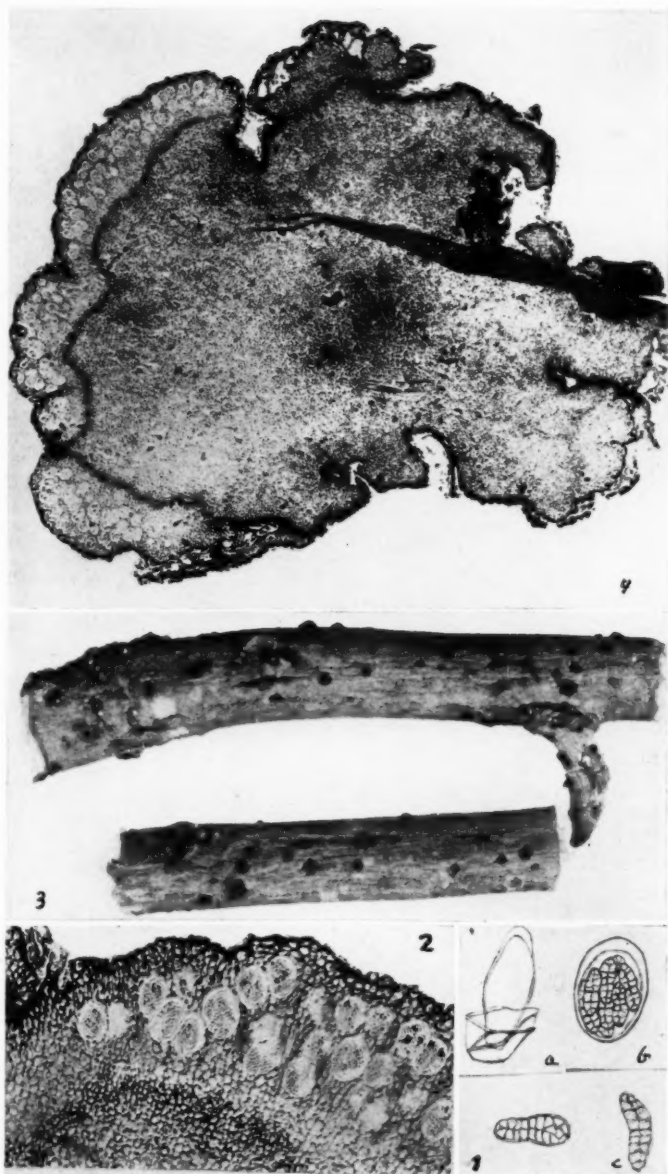
EXPLANATION OF PLATE 14

Fig. 1. (a) An expanded ascus with the ruptured sheath collapsed about its base; (b) an ascus with its spores, surrounded by the enveloping sheath which resembles a thickened ascus wall; (c) spores.

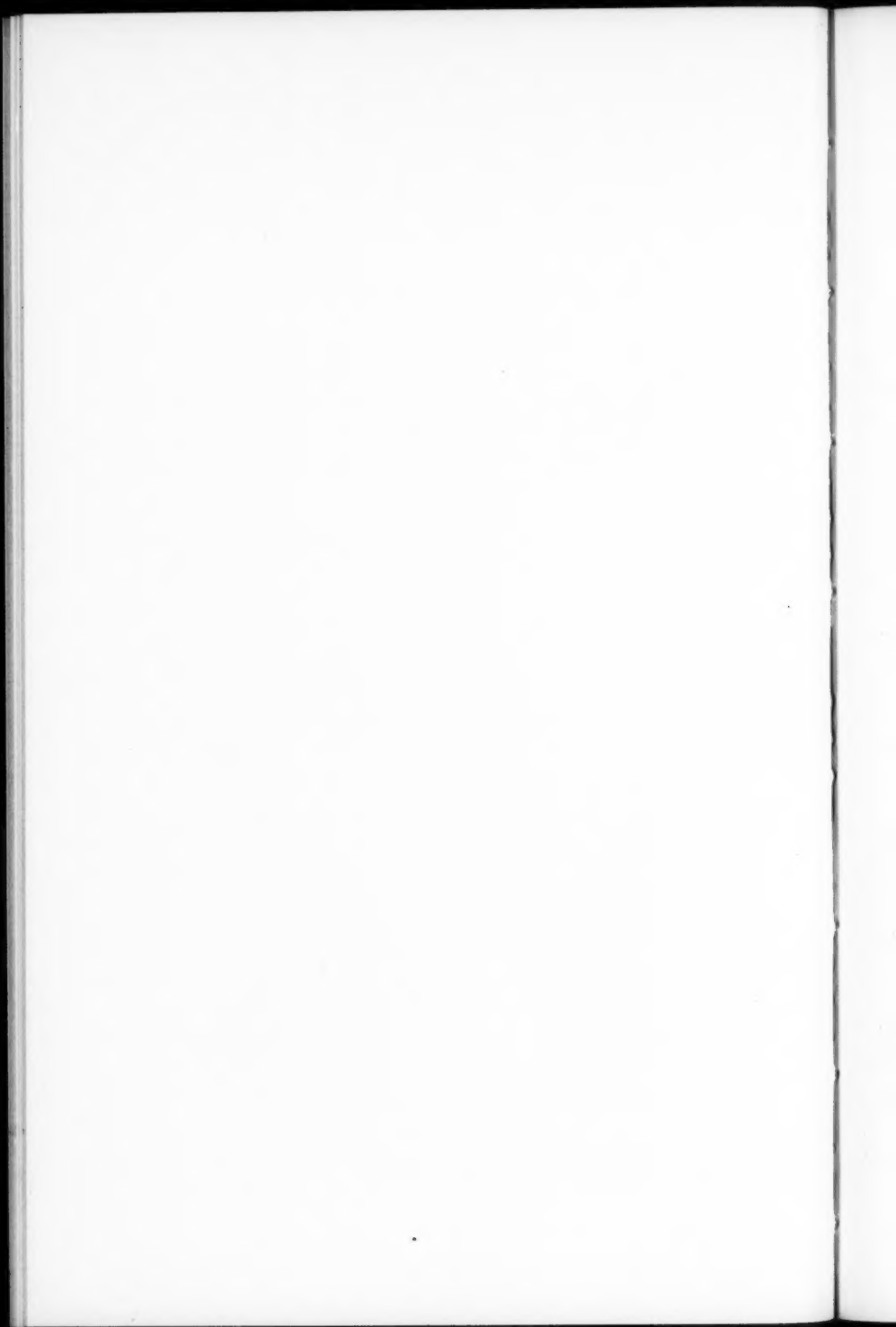
Fig. 2. Peripheral loculiferous portion of stroma as represented in figure 4, enlarged.

Fig. 3. Twigs of *Carya illinoensis* bearing the stromata of the fungus.

Fig. 4. Section through a stroma showing pseudo-parenchymatic structure and loculiferous region located near periphery.



MYRIANGIUM TUBERCULANS MILES



## NEW JAPANESE FUNGI

### NOTES AND TRANSLATIONS—XI

TYÔZABURÔ TANAKA

HELMINTHOSPORIUM ORYZAE Miyabe & Hori sp. nov. ex S. Hori in Nôji Shikenjô Hôkoku (Bulletin of the Agric. Exper. Station), Nishigahara, Tôkyô, no. 18: 67-84. M. 34, xi, Nov., 1901. (Japanese); Saccardo, Sylloge fungorum 22: 1394. 1913 (nom. nud.); Oudemans, Enum. syst. fung. 1: 723. 1919 (nom. nud.).

Spots scattered or grouped, fuliginous or soot-color, velvety; conidiophores fascicled, 2-5 in group meeting rather loosely at the base, dark-brown, more or less bending, 7-15-septate, lowermost cell largest, rather rounded and swollen, width of cells gradually reduced toward the apex, terminated by blunt, thin-walled, light-colored or almost colorless cell, 100-330 x 6-8  $\mu$ ; conidia lunate or obclavate bending to one side, obtuse at both ends, easily detached, pale-olivaceous of sooty shade, 6-11-septate, only slightly constricted at the septum, contents finely granular, 84-140 x 16-22  $\mu$ , germinating at both ends.

Parasitic on culms, leaves, and glumes of *Oryza sativa*.

TYPE LOCALITIES: Experimental farm of the Imperial Agricultural Experiment Station, Nishigahara, Tôkyô, Sept., 1900 (S. Hori); Tôkyô-fu Minamitama-gun Motohachiôji-mura, Sept. 26, 1900 (S. Hori); Okayama-ken, Sept., 1900 (T. Nishida).

Japanese name of the disease: Ine Goma-hagarebyô (Sesame-spot leaf blight of rice plant) ex Hori in Dainippon Nôkwaihô (Journ. Agric. Soc., Japan), no. 380: 6. Feb., 1913. (Japanese.)

Hori later revised the description as follows: Conidiophores 2-3-fascicled, brownish, 100-330 x 7.2  $\mu$ ; conidia 6-10-septate, fuscous. See Hori's Nôsakumotsu Byôgaku (Discourse on diseases of agricultural crops), Tôkyô, Seibidô, June, 1911, pp. 106-107. (Japanese.)

ILLUSTRATION: Hori's original drawings of conidia and conidiophores are seen in the book above mentioned (p. 107). Ideta's

Handbook (*see* Mycologia 9: 167), p. 744, also gives fairly good illustrations of the fungus.

Both paddy and upland rices are infected. The fungus usually appears as minute spots on the leaf blade, about the size of sesame seeds, often elongated or confluent, forming larger spots. In such infected leaves, especially when the plant is young, the discoloration and withering soon follow, proceeding from the leaf-tip, often causing death of the entire plant. In an advanced stage of the disease characteristic brown velvety bodies are produced from the surface of the diseased spots.

K. Hara (in Hara's *Ine no Byôgai*, Diseases of the rice plant, Gifu-ken, June, 1918, p. 61, in Japanese) states that the Japanese rice blight fungus might be identical with that which had been described by Breda de Haan as *Helminthosporium Oryzae* (in Bull. l'Institut. Bot. Buitenzorg., no. 6: 11. 1900), though the description of the latter is rather imperfect. The present species, however, differs very strikingly from *H. macrocarpum* Grev. in the shape of the conidia which are obclavate or fusoid, whereas in the latter they are simply clavate (refer Fig. 249 CH of Engler & Prantl, Nat. Pflanzenfam. I, 1\*\*: 479).

The disease was first known in Japan about 1895, but is now established everywhere as far as Formosa. Recently prevention through seed treatment and spraying with various kinds of fungicides has proved to be effective. *See* Nishikado, Y., in Byôchûgai Zasshi (Journ. Pl. Prot.), 5<sup>o</sup>: 693-712, Sept., 1918, and Suyematsu, N., ditto, 7<sup>1</sup>: 26-29, Jan., 1920 (both in Japanese). In a series of inoculation tests, a number of rice-plant varieties as well as wild grasses was examined by Suyematsu in connection with the susceptibility and resistance to the *Helminthosporium* rice blight. *See* Suyematsu, N., in Nôgaku Kwaihô (Journ. Sci. Agric. Soc.), Tôkyô, no. 212: 279-286, Apr., 1920; no. 214: 443-446, June, 1920; and no. 217: 655-657, Oct., 1920. (All in Japanese.)

GLOMERELLA CINNAMOMI Yoshino sp. nov. in Shokubutsugaku Zasshi (Bot. Mag.) Tôkyô, 21<sup>218</sup>: 230-232, Pl. 5. M. 40, ix, Sept., 1907. (Japanese.)

Mycelia first colorless, later fulvous, hyphae mostly colored in

substratum, septate,  $2-3.5\ \mu$  across; acervuli of conidial stage (*Gloeosporium*) minutely tuberculate, subepidermal, later erumpent, light pink in color; stromata disciform, brown; conidiophores densely seated on the stroma; conidia oblong, frequently ovoid ellipsoid or cuneate, often slightly curved, without guttulae or  $1-2$ -guttulate, colorless, light pink in mass, variable in size but chiefly  $10-18 \times 4-6\ \mu$ ; perithecia subepidermal, black punctiform, solitary or two together, globose or depressed-globose, slightly raised at the apex with orbicular ostiola  $17-20\ \mu$  wide, brown or brownish-blue,  $100-150\ \mu$  in diam.; asci numerous in one perithecium, fusoid, broad at the middle, narrowed near the apex, wall often thickened at the apex but not stained by iodine,  $46-60 \times 8-13\ \mu$ , octosporous, paraphysate; ascospores oblong, narrowed at both ends, usually curved, hyaline, non-guttulate or guttulate,  $10-15 \times 3.5-5\ \mu$ .

On *Cinnamomum camphora*, infesting leaves, petioles, leaf-buds, and young shoots in the nursery, causing considerable damage. Old plants are also infected. Diseased spots are usually orbicular, elliptical, or fusiform,  $3-5\ \text{mm.}$  in diam., first reddish-brown, later becoming fuliginous, finally fading into light-brown. The infected area is definitely marked from the healthy part, usually sunken, and when severely affected the infected areas become confluent, causing brown rot of the surrounding part, finally girdling the stem and killing the entire plant.

TYPE LOCALITIES: Kumamoto-ken. Yatsushiro-gun, Dec. 29, 1905 (T. Tejimazaki); Kikuchi-gun Waifu-chô, Oct. 25, 1906 (K. Yoshino); Hôtaku-gun Ôe-mura, Nov., 1906 (K. Yoshino); Ashikita-gun Hinagu-chô, Dec., 1906 (K. Yoshino); Hôtaku-gun Kawachi-mura, May 12, 1907 (T. Nishida); and Saga-ken Saga-shi, Nov., 1906.

ILLUSTRATION: One copper plate giving ten figures, showing the diseased plant, conidial layer, germination of conidia, perithecia, asci, ascospores, and germination of ascospores.

DISTRIBUTION: Formosa. See Sawada, K., in Taiwan Haku-butsu Gakkwai Kwaihô (Journ. Formosan Nat. Hist. Soc.), no. 25: 131-133. T. 5, x, Oct., 1916. (Japanese.)

Sawada states that the outbreak of the disease in the nursery and young plantation of camphor trees near Taihoku caused much damage in the spring of 1913. The Formosan fungus generally agrees with that described from Kyûshû by Yoshino, with the exception

of the smaller size of the ascospores, which Sawada finds to measure  $12-13 \times 5.5-7 \mu$ . Sawada also revises the description of the fungus as follows: "Conidiophores straight or more or less curved, simple, hyaline,  $16-27 \times 3.5-4 \mu$ ; asci clavate-fusoid or fusoid,  $53-67 \times 8-8.5 \mu$ ."

Hara in *Shokubutsugaku Zasshi* (Bot. Mag.) Tōkyō, 27<sup>317</sup>: 272 (Japanese) suggests to call the present species *Guignardia Cinnamomi* (erroneously spelled *cinnamomii*) on account of the lack of the stroma which should be present in *Glomerella*.

**PHYSODERMA MAYDIS** Miyabe in A. Ideta, *Nippon Shokubutsu Byōrigaku* (Handbook of plant diseases of Japan) ed. 4, Tōkyō, Shōkwabō, M. 42, 1909, part 1: 114, fig. 19. (Japanese.)

*Cladochytrium* sp. nov. K. Sengoku, in *Ehime-ken Nōkwaihō Journ. Agr. Soc., Ehime prefecture*) no. 32: 58, M. 34, xii, Dec., 1901. (Japanese.)

*Cladochytrium Maydis* Miyabe in Ideta's *Nippon Shokubutsu Byōrigaku* (Handb. Pl. Dis., Japan)<sup>1</sup> ed. 3, Tōkyō, Shōkwabō, M. 36, 1903, p. 75 (nomen nudum): Omori, J. & Yamada, G. *Shokubutsu Byōrigaku* (Plant pathology) Tōkyō, Hakubunkwan, M. 37, 1904, p. 202 (nomen nudum).

Occurs on the parenchymatous cells of the culm, midrib of the leaves, and the lower part of the husk, producing numerous orbicular, elliptical, or linear spots; spots mostly small-sized, often confluent, brown or fuliginous, light-colored near the margin, much deeper at the center; sporangia ellipsoid-ovate or globose, deep-brown,  $24-26 \times 22-24 \mu$ .

Parasitic on *Zea Mais*.

<sup>1</sup> Referring to Ideta's Handbook of Plant Diseases here quoted, the first and second editions were published in 1901 and in 1902, respectively, under the title *Jitsuyō Shokubutsu Byōrigaku* (Practical discourse on plant diseases); the third edition, issued in 1903, was greatly enlarged and largely rewritten, and bears a new title, *Nippon Shokubutsu Byōrigaku*; it is called the third edition in the German title page only. The fourth edition, which came out under the same title, was issued originally in two parts, the first in 1909 (pp. 1-344) and the second in 1911 (pp. 345-935, with appendices), and is really a new work written under the critical supervision of Prof. K. Miyabe, who contributed diagnoses of some of his new species published here for the first time. Unaltered reprints of the fourth edition were issued in 1912 and in 1914, sometimes called fifth and sixth editions.

The disease does not usually prevent fruiting, but sometimes does when it occurs abundantly in the early stage of the host plant. In 1901 the disease was first discovered by K. Sengoku in the prefecture of Ehime, Shikoku island, and the above description is probably based upon the material collected at this time. It has not been reported from any other locality in the Japanese territory.

ILLUSTRATION: One black-and-white wood-cut figure showing sporangia.

Notes: *Physotheria zeae-maydis* Shaw, first reported from India (Sydow, H., Sydow, P., & Butler, E. J., in *Annales mycologici* 10<sup>3</sup>: 245-247, fig. 2. 1912), and now known as the causal organism of one of the worst diseases of corn in the United States (see Tisdale, W. H., in *Journ. Agr. Res.* 16<sup>5</sup>: 137-154, 10 pls., Feb., 1919), is, in many respects, identical with the present species, though no actual comparison of the organism has yet been carried out. Plant quarantine against this fungus was announced by the U. S. Department of Agriculture in 1916 (see Notice of Quarantine No. 24. 1916).

MYCOSPHAERELLA BAMBUSIFOLIA Miyake & Hara sp. nov. in *Shokubutsugaku Zasshi* (Bot. Mag.) Tôkyô, 24<sup>286</sup>: 338-340, M. 43, xi, Nov., 1910. (Japanese.)

Follicolous; pycnidia punctiform, black to the naked eye, immersed, globose or depressed-globose, fuliginous, open at the apex, 70-100 x 60-90  $\mu$ ; pycnosporos abundant, oozing from pycnidial opening when mature, ellipsoid ovoid or cylindrical, hyaline, 2-3.5 x 1-1.5  $\mu$ ; pedicels minute; perithecia mixed with the pycnidia, globose or depressed-globose, 70-100  $\mu$  broad, 90-100  $\mu$  high, rarely 60  $\mu$  in diam.; wall thick, fungoid-parenchymatous, fuscous or black, ostiola as high as the epidermal plane or slightly raised; asci many, fasciculate, oblong-ovoid and more or less stipitate below or fusoid-lunate and obtuse at both ends, 37-50 x 9-10  $\mu$ , octosporous, paraphysate; ascospores distichous, ovoid or ellipsoid, uniseptate, usually not constricted, hyaline, at first granular, usually becoming homogeneous later, 13-16 x 4.5-5  $\mu$ .

Parasitic on *Phyllostachys puberula* and *Phyllostachys bambusoides*.

Infected leaves develop round, elliptical, or irregular fuscous

spots of black periphery, which often run together in increasing size, finally causing death of the surrounding area. This gives the leaves a brownish appearance, and when they are severely infested the entire bamboo grove appears badly discolored and seriously injured. Later fruiting bodies make their appearance on the discolored area as minute black spots.

TYPE LOCALITIES: Gifu-ken Ena-gun Tōyama-mura and Kawauye-mura, Apr., 1908; Tōkyō Komaba, May, 1909.

Differs from *Mycosphaerella Arundinariae* Atk. (Bull. Corn. Univ. 3<sup>1</sup>: 9. 1897) in the absence of brown hyphae around the perithecium, and in the shape and size of the asci and ascospores.

PHAEOSPHERIA BAMBUSAE Miyake & Hara sp. nov. in Shokubutsugaku Zasshi (Bot. Mag.) Tōkyō, 24<sup>286</sup>: 340-341, M. 43, xi, Nov., 1910. (Japanese.)

Foliicolous; spots appear along the vein, often with indefinite margin, brown or dark-colored, later becoming grayish or fuscous from the middle, finally covering the entire leaf; perithecia minutely punctiform, scattered or along the veins, immersed, globose or depressed-globose, black, 120-170 x 140-210  $\mu$ ; wall rather thin, dark-colored or fuscous, ostiolate at the apex; asci numerous, fascicled, clavate or cylindrical, 65-90 x 18-27  $\mu$ , octosporous, paraphysate; ascospores distichous or irregular, fusoid or ellipsoid, straight or slightly curved, triseptate, constricted, hyaline and granular when young, dark-colored with age, 25-30 x 10-12  $\mu$ .

*Phyllosticta* stage usually makes its appearance with the ascigerous stage on the same diseased spot as it does in the case of *Phaeosphaeria Oryzae* Miyake. (See Journ. Coll. Agric., Imp. Univ. Tokyo 2<sup>4</sup>: 247. 1910.) The description of this form follows:

Pycnidia immersed, globose or depressed-globose, ostiolate at the apex, 100-140 x 70-100  $\mu$ ; pycnosporous ooze from the pycnidial opening when mature, ellipsoid or cylindrical, hyaline, 2-2.5 x 1.1-3  $\mu$ .

On the living leaves of *Arundinaria Simoni* and *Sasa paniculata*.

TYPE LOCALITIES: Tōkyō Komaba, July, 1906 (D. Karashima), July, 1910 (I. Miyake & K. Hara); Tochigi-ken Nikkō, Aug., 1910; Gifu-ken Ena-gun Kawauye-mura, Aug., 1910 (on the second host).

USTILAGINOIDEA SACCHARI-NARENGAE K. Sawada sp. nov. in Taiwan Hakubutsu Gakkwai Kwaihô (Journ. of Formosan Nat. Hist. Soc.) 4<sup>15</sup>: 4-5. T. 3, v, May, 1914. (Japanese.)

Ovary infesting, appearing in group on the ear of the host plant, dark olive in color, balloon- or top-shaped, rounded at the apex, 3 mm. long, first covered by a membrane, later rupturing at maturity, exposing the dark-olive spore mass inside, lower part of the mass being associated with glume and palea, hard, sclerotium-like, inside of the mass white or very light straw-color, composed of closely arranged angular cells; spores globose or ovoid, covered with comparatively large-sized warts, dark-olive, 4-5.5 usually 4.5-5  $\mu$ .

Parasitic on *Saccharum narenga*.

TYPE LOCALITY: Akôchô Hanshoryô Keishûshô, Formosa, Dec. 10, 1907. (Y. Shimada.)

The cross-section of the sclerotium-like body is entirely parenchymatous, and no parallel hyphae are visible as in the case of *Ustilaginoidea Oryzae* Bref.

PLASMOPARA WILDEMANIANA P. Henn. var. MACROSPORA K. Sawada var. nov. in Taiwan Hakubutsu Gakkwai Kwaihô (Journ. Formosan Nat. Hist. Soc.) no. 16: 2-4. T. 3, vii, July, 1914. (Japanese.)

Foliicolous; spots irregular, often occupying the entire leaf, light yellowish-green, white mouldy on the lower surface; hyphae in mesophyl intercellular, invading the cell only by haustorium, colorless, continuous, branching, 7-13  $\mu$  thick; haustoria globose or ovoid-globose, 13-17 x 9-18  $\mu$ ; conidiophores fascicled from the stoma, upright, 320-605  $\mu$  long, main axis 8-12  $\mu$  thick, slightly swollen at the base, first branching at about one half or one third of the whole length from the base, usually branching 5 to 7 times, terminal branchlets (commonly 4-8  $\mu$  long) and their underlying branchlets very short; conidia ovoid or elliptic-ovoid, rounded at the apex, papillate at the base, colorless, 14-18 x 11-13  $\mu$ .

Parasitic on the leaf of *Justicia procumbens*.

TYPE LOCALITY: Formosa. Taihokuchô Chônaihoshô, Sept. 12, 1908 (Y. Fujikuro), Apr. 5, 1913 (Y. Fujikuro).

The present variety has noticeably larger-sized conidia than those of the type species described by P. Hennings and later by Sydow

and Butler. (See Wildeman, E., *Études Flor. Bas- & Moyen-Congo*, Sér. 5. II<sup>2</sup>: 85. 1907, and *Ann. Mycol.* 10<sup>3</sup>: 243-244. fig. 1. June, 1912.) Sawada suggests that more noticeable difference may be revealed if they are closely compared as in the case of species of *Bremia*. (See *Mycologia* 11<sup>2</sup>: 84-86. March, 1919.)

*COLLETOTRICHUM BOEHMERIAE* K. Sawada sp. nov. in Taiwan Hakubutsu Gakkwai Kwaihô (*Journ. Formosan Nat. Hist. Soc.*) no. 17: 2. T. 3, ix, Sept., 1914. (Japanese.)

Follicolous or caulicolous; spots scattered, cinereous with brown margin, orbicular and 1-2 mm. diam. on leaves, when on stem, forming orbicular, elliptical or fusiform spots, occasionally causing longitudinal rupture of the host epidermis, 1-6 x 0.8-2 mm. in size; hyphae colorless, 4  $\mu$  thick; acervuli small, with setae; conidiophores dense, short, terminated by conidia; conidia colorless, cylindrical or occasionally clavate, straight, obtuse at both ends, granular, 14-19 x 4-5  $\mu$ ; setae dark-brown, tapering toward the apex, 1-2-septate, 45-85 x 4-5  $\mu$ .

Parasitic on Ramie (*Boehmeria nivea*).

TYPE LOCALITY: Taihokuchô Chônaihoshô, Formosa. June 29, 1914 (A. Imachi).

Stem infection causes bad staining of the bast fibers, which is hardly removable when the fibers are bleached. The infected plant, therefore, yields only lower grade fibers of less commercial value.

*CERCOSPORA PIRICOLA* K. Sawada sp. nov. in Taiwan Hakubutsu Gakkwai Kwaihô (*Journ. Formosan Nat. Hist. Soc.*) no. 17: 3. T. 3, ix, Sept., 1914. (Japanese.)

Hypophyllous; spots usually angular, occupying certain area enclosed by veinlets, later coalesce, often cover the entire surface, cinereous, later changing into brown, generally 1-3 mm. in diam.; conidiophores fascicled, several or more than ten together, straight or curved, cinereous, 0-2-septate, 15-27 x 3-4  $\mu$ ; conidia linear, curved, 3-5-septate, grayish or almost colorless, 28-57 x 2.5-3.5  $\mu$ .

On *Pirus communis* (pear) and *Pirus sinensis* (sand-pear).

TYPE LOCALITIES: Formosa. Taihokuchô Chônaihoshô, Jan. 15, 1910 (Y. Fujikuro), Sept. 2, 1911 (K. Sawada); Taichûchô Tai-

heishô, Aug. 6, 1911 (Y. Fujikuro); Kagichô Toroku, Apr. 30, 1913 (K. Sawada).

Resembles *Cercospora minima* Tracy & Earle (Bull. Torr. Bot. Cl. 23<sup>3</sup>: 206. May, 1896) on pear from America, but differs in being hypophyllous and in having longer conidiophores and shorter but thicker conidia of grayish color, while the American species is characterized by being epiphyllous and having shorter conidiophores and slender and hyaline conidia.

The extent of injury due to this fungus is not known.

USTILAGO FORMOSANA K. Sawada sp. nov. in Taiwan Hakubutsu Gakkwai Kwaihô (Journ. Formosan Nat. Hist. Soc.) no. 34: 6-8. T. 7, v, May, 1918. (Japanese.)

Infesting inflorescence and the upper part of the culm; sori linear, fuliginous, 2.5-14 cm. long, at first enclosed by grayish-white membrane, later escaping from enclosing sheath, ruptures and emits black spore mass inside, leaving only fibrous tissue behind; spores globose or subangular-globose, light reddish-brown, containing granules, 5-7  $\mu$  generally 5.5-6  $\mu$  in diam.; episore apparently smooth, but finely echinulate under close observation; promycelia very short and continuous, or somewhat longer and uniseptate, producing sporidia at the end or at the joint between two cells, 8-17  $\times$  1-3  $\mu$ ; sporidia fusoid to oblong-fusoid, often producing secondary sporidia thereupon, 3-6  $\times$  1-2  $\mu$ ; germinating tube sometimes formed on the promycelium.

On *Panicum proliferum*.

When the disease occurs in the field, whole culms arising from common root are infested.

TYPE LOCALITIES: Formosa. Taihokuchô Chônaihoshô, May, 1906 (S. Suzuki), Apr. 22, 1907 (Y. Fujikuro), Aug. 10, 1908 (Y. Fujikuro), Nov. 27, 1908 (K. Sawada), Dec. 4, 1908 (K. Sawada); Tôenchô Nanseishô, June 2, 1917 (K. Sawada); Taitôchô Daimabukutsu, Apr. 29, 1909 (K. Sawada); Taitôchô Toran, May 21, 1911 (K. Sawada).

Differs from *Ustilago Panici-proliferi* P. Henn., which occurs on *Panicum proliferum acuminatum* in America, in having distinctly smaller spores.

BUREAU OF PLANT INDUSTRY,  
WASHINGTON, D. C.

## NOTES AND BRIEF ARTICLES

[Unsigned notes are by the editor]

Dr. Murrill visited the State Museum at Albany early in February to study types of certain species of dark-spored gill-fungi in collections made by the late Dr. Peck.

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Prof. H. M. Fitzpatrick, of Cornell University, spent several days at the Garden late in January examining specimens of an interesting group of Pyrenomycetes, which he is monographing. He also visited the mycological herbaria at Washington, Philadelphia, and Boston.

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Mr. Harold E. Parks, whose articles on underground fungi have been read with so much interest, has been appointed technical assistant and collector in the Department of Botany at the University of California. His address is no longer San Jose, but Berkeley.

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Supplementary lists of species of smuts and rusts occurring in Indiana, prepared by H. S. Jackson, were published in the *Proceedings of the Indiana Academy of Sciences* for 1920.

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Cryptogamic diseases of cacao and of cocoanut, over 20 in number, are discussed at length by R. Averna-Saccà in the *Agricultural Bulletin of San Paulo* for 1920. Forty-one figures accompany the 140 pages of text.

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An illustrated article by C. E. Chidsey in the *Scientific American Monthly* for November, 1920, attempts to explain the formation of knots and boles on forest trees. This article might be interesting in connection with some of the recent experiments on plant cankers.

In a paper on two new *Sclerotinia* diseases found in Washington, by B. F. Dana in *Phytopathology* for May, 1921, *Sclerotinia gregaria* and *S. demissa* are described as new. The former occurs on the leaves and fruits of *Amelanchier Cusickii* and the latter on the leaves, twigs, and fruits of *Prunus demissa*.

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Kauffman's paper on the species of *Inocybe* in Peck's collections, published in the Report of the State Botanist for 1919, contains many interesting notes and comments which are especially valuable because the author has recently completed a study of this difficult genus for *North American Flora*, which is expected to appear during the present year.

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Another paper on new or little-known hosts for wood-destroying fungi, by Arthur S. Rhoads, appeared in *Phytopathology* for August, 1921. Quite an array of interesting hosts are noted for many of our common species; and additions both to hosts and descriptive characters are made in the case of *Polyporus cuti-fractus* Murrill and *P. carbonarius* Murrill.

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A circular leaf-spot of geranium plants, caused by *Cercospora Brunkii*, is discussed by Garman in Bulletin 239 of the Maryland Experiment Station. Methods of watering, rather than mites and other insects, seem to spread the disease, which may be controlled by good ventilation, precautions against excessive humidity, and the use of Bordeaux mixture.

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For two years there has been an exhibit of the oriental diseases of the Para rubber-tree, *Hevea brasiliensis*, at the Imperial College of Science and Technology in London. The chief fungous diseases represented are those caused by *Fomes lignosus*, *Fomes pseudoferreus*, *Ustulina zonata*, *Phytophthora Faberi*, *Corticium salmonicolor*, *Cyphella Heveae*, and *Botryodiplodia Theobromae*. The specimens were shipped from Ceylon and Malaya under the direction of J. B. Farmer.

The Tuckahoe, or *Pachyma cocos*, was illustrated and described at some length in the *Missouri Botanical Garden Bulletin* for June, 1921. This fungous sclerotium was not used for food to any great extent, if at all, by the Indians, because it has little nutritive value; the word tuckahoe was simply a general term applied to any edible root. Various medicinal properties have been ascribed to *Pachyma cocos*, but there seems to be no real foundation for the traditional belief in its curative virtues.

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The following note regarding Krieger's remarks on *Amanita pantherina*, recently published in MYCOLOGIA, has been sent me by Neuhoﬀ. According to him, *A. pantherina* DC. is undoubtedly poisonous, and is so considered by practically all mycologists everywhere; but in Germany it has been confused by Michael with the non-poisonous species, *A. spissa* Fries, and this error has been widely disseminated. Several authors are quoted by Neuhoﬀ to support his opinion, among them Ricken, Romell, and Kauffman.

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I have been endeavoring for some time to locate the original collector of *Ganoderma oregonense*, published in 1908 in *North American Flora*. The following extract from a letter received from Prof. Kirkwood seems to supply the missing information: "I think that the collection of fungi to which you refer was one that I made in the summer of 1905, along the Tillamook coast. I remember having packed a box which I sent to you along about August of that year, or maybe in September. I kept no record of them, but think there was a *Ganoderma* in the lot."

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Philippine polypores were discussed by Graff in the *Torrey Bulletin* for last November. He uses *Polyporus Mariannus* Pers. for *P. anebus* Berk.; *P. rhodophocus* Lév. for *Fomes semilaccatus* Berk.; *Ganoderma leptopum* (Pers.) Graff for *G. umbraculum* Pat.; *Fomes lineatus* (Pers.) Graff for *P. fastuosus* Lév.; and *Fomes roseo-albus* (Jungh.) Bres. for *P. caliginosus* Berk. The following species of Murrill are reduced to synonymy: *Ganoderma Curranii* equals *G. leptopum*; *Pyropolyporus Williamsii* equals

*Fomes lamaensis*; and *Corioloopsis Copelandii* equals *Fomes roseoalbus*. The author reports a very extensive and rich fungous flora, with much still to be learned.

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In an article by Schmitz and Zeller on the effect of creosote on wood-destroying fungi, published in the *Journal of Industrial and Engineering Chemistry*, it is stated that the results of experiments indicate no toxic effects of any single distilled fraction or combination of fractions of the coal-tar creosote below a concentration of 1 per cent, calculated on the weight of air-dried sawdust. That is, there was no visible cessation of growth of either *Lenzites saccharia* or *Polyporus lucidus* below a 1 per cent concentration. In a majority of cases the toxic point, which is defined as the minimum percentage of the creosote which will completely inhibit the growth of the organisms, lies between 2 and 4 per cent.

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A splendid illustrated paper on "The Collybias of North Carolina," by Coker and Beardslee, appeared in the *Journal of the Elisha Mitchell Scientific Society* for December, 1921. Twenty-two species are recognized for the state, one of them, *Collybia lilacina*, being described as new. This species seems fairly abundant about Chapel Hill, and Dr. Coker has illustrated it both in color and in black and white. Our American *C. butyracea* is shown to be for the most part simply a large form of *C. dryophila*; and *C. subdryophila*, described by Atkinson from specimens collected in North Carolina by Coker, is considered a synonym of *C. dryophila*. The authors make *C. strictipes* Peck equivalent to *C. nummularia* Fries and *Mycena palustris* (Peck) Sacc. a synonym of *C. clusilis*. They also discuss the relationship of *C. tuberosa* and *C. cirrata*; and include *C. conigena* Fries, *C. hariolorum* Fries, *C. semitalis* Fries, and *C. distorta* A. & S. as good American species.

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Dr. B. M. Duggar writes me that my report of his paper at the Toronto meeting, published on page 51 of the January number of *Mycologia*, is not in accordance with what he meant to convey. "I

did make a statement," he says, "to this effect: 'The term agency rather than organism is employed because it is hoped to avoid any possible prejudice to the direction in which such research may lead. It is distinctly felt that any assumption tacitly ascribing such diseases, because infectious, to organisms of the known or usual types may serve in the end to restrict rather than broaden the investigation.' Moreover, because I was able to determine more or less definitely the dimensions of the infectious agency I did not state as quoted that 'therefore,' it 'can not be a germ or similar organism.' Finally, I do not term it a 'living fluid contagion,' but did merely quote from Beijerinck his well-known expression, 'contagium vivum fluidum.'" Fortunately, Dr. Duggar's paper will shortly be published in full and those interested in the subject will at once forget my inaccurate report of it.

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Enzyme action in *P. volvatus* and *F. igniarius* is discussed by Schmitz in the *Journal of General Physiology* for July, 1921. From the standpoint of parasitism, *Polyporus volvatus* is one of the most interesting of the wood-destroying fungi. Although no inoculation experiments have been made, numerous observations tend to confirm the opinion of the writer that it is truly parasitic. Throughout Washington, Oregon, and Idaho it is not at all unusual to find fruiting bodies appearing in great numbers over practically the entire surface of the trunk of Douglas fir, white fir, and western hemlock. This condition may be observed on trees still having a green, healthy foliage as well as on trees which to all appearances have been killed by the fungus.

Cultures of *Polyporus volvatus* and *Fomes igniarius* were obtained from the young sporophores by the tissue method. In *D. volvatus* the presence of the following enzymes was demonstrated: esterase, maltase, lactase, sucrase, raffinase, diastase, inulase, cellulase, hemicellulase, glucosidase, rennet, and catalase. In *F. igniarius* the presence of the following enzymes was demonstrated: esterase, maltase, lactase, sucrase, raffinase, diastase, inulase, cellulase, hemicellulase, glucosidase, urease, rennet, and catalase.

## A NEW LICHEN FROM AN UNUSUAL SUBSTRATUM

Dung of various animals is examined frequently by mycologists for fungi not found elsewhere, and algae and mosses are seen on these substrata not infrequently. Among the fungi the lichenist sometimes sees *Cladonia* and *Bacidia inundata*, but I had not until recently known of a lichen species found on no other substratum than dung.

For many years I have made it a practice to examine any dung that was colored green by algae or by moss protonemata, in the hope that I might find some new or rare lichen. Finally, on the tenth of March, 1920, near Conway, Rockcastle County, in central Kentucky, I found what appeared to be the minute fruits of some lichen which had parasitized *Protococcus* growing over some cow dung. These minute fruits were *Botrydium*-like in appearance, and examination showed that they belonged to a lichen of the genus *Thelocarpon*.

Growing with the *Thelocarpon* was another ascomycete with even more minute fruits, often giving the appearance of having parasitized the algae, forming a true lichen thallus. The *Thelocarpon*, on the other hand, showed no superficial thallus and no relationship with the algae other than that the fruits were rendered yellow-green by a layer of the algae, which spread over their surfaces. This condition made it appear that the lichen thallus was wholly within the substratum at the time when the fruits were mature, though algae were in all probability parasitized and a superficial thallus produced in early development, only to disappear later. Several species of *Thelocarpon* have been described as having no thalli, all of them probably having, in their early stages of development, superficial thalli of one of the types found among crustose lichens. In all of these instances it would be worth while to trace out the relationship between the lichen and the algae, which occur always in the thalloid veils of species of *Thelocarpon*, and usually in crustose thalli as well.

The description below was prepared after a careful examination of the descriptions of the 30 known species of the genus.

***Thelocarpon fimicola* Fink sp. nov.**

Superficial thallus absent, or not readily distinguishable from the layer of algae growing over the surface of the substratum; apothecia minute and spheroidal, 0.05 to 0.15 mm. in diameter, pale within and surrounded by a thin thalloid veil; asci at first cylindrical, but becoming variously ventricose as the spores mature, most commonly distended toward the center and tapering toward both ends; paraphyses inconspicuous and disappearing as the fruit matures; spores one-celled, minute, hyaline, spheroidal to oblong, 2 to 4 by 1.5 to 2 mic., very numerous in each ascus.

Growing with algae on cow dung, in a damp wood, near Conway, Rockcastle County, Kentucky. The algae which were growing on the substratum gave it a coloration which could be detected from a standing position, but there is little evidence of the presence of algae in the dried specimens.

BRUCE FINK

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**ANOTHER GREEN-SPORED GENUS OF GILL-FUNGI**

While working over specimens of *Pilosace* for the article on dark-spored agarics, published earlier in this number, I discovered some interesting things which did not properly belong under that title, so I have set them apart here.

*Chlorophyllum* Mass., based on the plant known as *Lepiota Morgani*, was published in 1898 and discussed in N. Am. Flora 10: 64. 1914. It differs from *Lepiota* in having green spores.

*Chloroneuron* Murrill, based on the tropical American species, *Neurophyllum viride* Pat., was published in Mycologia 3: 25. 1911 and discussed in N. Am. Flora 9: 172. 1910. The spores are green and the lamellae fold-like, as in *Chanterel*.

In the new genus here described the spores are green and the lamellae adnate or adnexed, as in *Hypholoma* or *Psathyra*. *Schulzeria* Bres. is a "*Lepiota* without an annulus," having free gills and hyaline spores. Massee's *S. Eyrei*, however, has green spores and an appendiculate veil, with free gills.

***Chlorosperma* gen. nov.**

Hymenophore putrescent, solitary to subcespitose; pileus fleshy,

glabrous or finely floccose; lamellae adnate or adnexed, often seceding at an early stage so as to appear free; spores smooth, green; stipe central, cartilaginous; veil, if present, not forming an annulus.

The type of this genus is *Agaricus olivaeusporus* Ellis & Ev., described below.

***Chlorosperma olivaeuspora*** (Ellis & Ev.) comb. nov.

*Agaricus eximius* Peck, Ann. Rep. N. Y. State Mus. 24: 70.

1872; not *A. eximius* C. P. Laest. Lapp. Torn. 1860.

*Agaricus olivaeusporus* Ellis & Ev. Jour. Myc. 5: 27. 1889.

*Hypholoma vinosum* Kauffm. Agar. Mich. 1: 261. 1918.

*Pilosace Peckii* House, Bull. N. Y. State Mus. 205-206: 39. 1919.

Pileus thin, fleshy, fragile, convex or campanulate to expanded, subumbonate, solitary to subcespitose, 1-2 cm. broad; surface smooth or obscurely rugulose, pulverulent-floccose, becoming nearly glabrous, dark-brick-colored when moist, purplish-umber when dry, at length dark-sooty-brown; margin appendiculate at first with pale fragments of the veil; context thin, dingy-white, fragile, with very sweet odor and taste; lamellae adnate, seceding, crowded, rather broad, rounded behind, nearly plane to ventricose, entire on the edges, purplish-violet or purplish-brown to chestnut-brown, becoming lighter when dry and more or less tinged with brick-red; spores ellipsoid, smooth, olive-brown when fresh, umber-brown on drying, olivaceous under the microscope, about  $5 \times 3 \mu$ ; cystidia none; stipe slender, equal, colored and clothed like the pileus, cartilaginous, fistulose, rather brittle, exuding a slight purplish juice when broken, 2-4 cm. long, 1-2 mm. thick.

TYPE LOCALITY: Newfield, New Jersey.

HABITAT: On much-decayed wood, stumps, or logs in mixed woods, or among moss in swamps.

DISTRIBUTION: Rare in New York, New Jersey, Pennsylvania, Ohio, and Michigan.

ILLUSTRATION: Hard, Mushr. f. 259.

EXSICCATI: Ellis & Ev. N. Am. Fungi 2009.

Peck's type specimens were collected on old stumps in woods at Greig, New York, in August, 1870. The sheet containing these has others from Old Forge, Indian Lake, and Felt House, with a drawing in color. Peck describes the gills as reddish, and later

applies this term to the spores, which was probably an error on his part. Because of this some have claimed that the species should be transferred to *Pluteus*. Hard says that he found the plant on three different occasions in Haynes' Hollow growing on old stumps and decayed logs. His figure is from a photograph of some of his plants taken by Kellerman and his description from Peck, no reference being made to the color of the spores.

Ellis found his plants among moss in swamps at Newfield, New Jersey, in sufficient quantity for distribution. An original packet in his herbarium is marked "July 30, 1887. Spores ellipsoid,  $3.5-4 \times 2 \mu$ , olive-brown." In his description, he says the green shade is very distinct. He agrees with Peck in calling the lamellae "free."

Kauffman's specimens, some of which I saw at Albany, came from Bay View, New Richmond, Michigan, on much-decayed wood or logs in mixed woods. According to him the lamellae are adnate at first, then seceding; and the spores purplish-brown in mass, pale under the microscope. I find them to be identical with those from specimens collected by Peck and Ellis. Mrs. Delafield got a cluster of three hymenophores at Buck Hill Falls, Pennsylvania, last July and made a colored sketch of it. She found the "lamellae free or slightly adnate, separating readily from the stipe; odor very sweet, taste sweet."

The differences in the color of the spores recorded above are doubtless due to observations made on fresh and dried spores in mass by reflected light and under a microscope by transmitted light varying in intensity.

W. A. MURRILL

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